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Issues in second trimester induced abortion (medical/surgical methods)

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Second trimester abortion remains a common procedure worldwide. Dilatation and evacuation (D&E) is the surgical method of choice, if the surgical expertise and facilities are available. Adequate cervical dilatation preoperatively is a prerequisite for a safe D&E. Medical abortion using misoprostol together with mifepristone is the medical method of choice. The recommended regimen is 200 mg mifepristone followed by 800 μg of vaginal misoprostol 36–48 h later. Subsequent doses of 400 μg of misoprostol can be given orally every 3 h up to a maximum of four more doses. Proper preoperative assessment would not only help to provide safe abortion treatment, but it also guides the choice of method. If the expertise and facilities of both methods are available, both methods should be discussed and offered to the patient so that the patient can make an informed choice.

Q3 Second-trimester abortion refers to the abortion performed between 13 and 28 gestational weeks. Abortion is one of the most common procedures done worldwide with an estimated 42 million induced abortions in 2003, compared with 46 million in 1995. The induced abortion rate in 2003 was 29 per 1000 women, of which, 48% of all abortions worldwide were unsafe, and more than 97% of all unsafe abortions were in developing countries.[1] Second-trimester abortions account for 11.2% of all abortions in the United States (USA) in 2005 and 9.7% in the United Kingdom (UK) in 2008.[2,3] In general, two-thirds of all major complications of abortions are attributable to those performed in the second

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trimester.[4] As the complication rate was much higher in abortions performed in the second trimester, it is important to facilitate the access to first trimester abortion to reduce the incidence of second trimester abortions, and to provide facilities for safe second trimester abortion in order to reduce the complication rates. However, the rate of second trimester abortions has remained the same in the recent decade.[2] In this article, the following issues on second trimester abortions are discussed: pre-abortion assessment and preparation, surgical methods, medical methods, patients with previous caesarean section and the factors affecting the choice of the method.

Pre-abortion assessment and preparation

To provide safe second trimester abortion, there should be careful pre-abortion assessment and preparation. A detailed history and careful physical examination should be performed to exclude possible medical disorders, risk factors for complications of abortion and to assess the gestational age of the pregnancy. If there is a discrepancy between the gestational age as estimated by the date of the last menstrual period and the uterine size, an ultrasound examination should be performed for accurate dating of the pregnancy. These will provide important information for the physicians and the pregnant women to choose the best-available treatment methods.[5] Counselling before abortion by appropriately trained personnel, such as nursing specialists and contraceptive counsellors, is also vital to reduce the risk of regrets and psychological burdens, and to plan for future contraception to decrease the chance of repeated abortions of unintended pregnancies. Proper assessment remains the most important way to reduce the chance of complications. Because of the possibilities of serious complications, second trimester abortions should be performed in facilities with easy access to blood transfusion and emergency laparotomy.

Surgical methods

Surgical abortion in the second trimester is the most common method in some countries such as USA and UK. Dilatation and evacuation (D&E) is the most common surgical method used for second trimester abortion. D&E was done in 98.6% of abortions between 13 and 15 weeks, 95.4% between 16 and 20 weeks and 85.1% at 21 weeks or later in USA,[2] and 95% of abortions after 13 weeks in UK.[3]

Before D&E became the surgical method of choice in the 1970s, hysterotomy and hysterectomy, which are rarely done nowadays, were the only options for abortion after 17 weeks of gestation, other than medical methods. Hysterotomy, resembling a caesarean delivery on a pre-term uterus, consists of a laparotomy, incision on the uterus, removal of the product of gestation through the incision, together with the repair of the uterus. However, a low, transverse uterine incision is usually not possible, thus committing the patient to caesarean deliveries in future pregnancies.[6] This procedure is only performed when there is an obstruction of the cervix, either by uterine anomaly or by fibroid, or when the myometrium is too thin to safely manipulate instruments or to induce abortion. Hysterectomy should only be performed when there are other indications for hysterectomy.

D&E refers to transcervical instrumental evacuation of the pregnant uterus at $\geq$13 weeks' gestation.[7] The most common method of D&E involves preparation with cervical dilatation, aspiration of amniotic fluid with disarticulation and removal of the foetus through the prepared cervix using strong, elongated extraction forceps.

One variant of D&E is known as intact dilatation and extraction (D&X). According to the American College of Obstetricians and Gynecologists (ACOG) Statement of Policy on abortion, published in 2007, D&X included four elements: (1) deliberate dilatation of cervix, usually over a sequence of days; (2) instrumental conversion of the foetus to a footling breech; (3) breech extraction of the body excepting the head; and (4) partial evacuation of the intracranial contents of a living foetus to effect vaginal delivery of a dead but otherwise intact foetus.[8] There is no good evidence regarding which method is the better option, while a retrospective analysis revealed the safety of both methods.[9]

Complications

Complications of D&E include cervical injury, incomplete evacuation, bleeding, infection and perforation of the uterus. Adequate cervical dilatation before D&E can help reduce the risk of

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complications. It was shown by various studies that the more the *Laminaria* is used resulting in a decreased need for intra-operative cervical dilatation, the less likely it is to have complications such as cervical injury or vaginal bleeding during D&E.[10,11]

Bleeding is the most common complication of surgical abortion in the second trimester. Its incidence increases with gestational age.[7] The use of uterotonics, such as oxytocin, is commonly employed to reduce the amount of blood loss of the procedures. However, its efficacy was not proved by any prospective trial. A retrospective analysis over 8 years' data showed the effectiveness of uterine artery embolisation as the sole method to control the haemorrhage due to disruption of fibroid, placenta accreta and cervical lacerations.[12] There was also a case report of using tamponade with a large intrauterine balloon to successfully manage intra-operative haemorrhage during D&E at 18 weeks of gestation for foetal aneuploidy not resulting from uterine atony.[13]

Uterine perforation is another serious complication in second trimester surgical abortion, with the incidence of 0.32%.[14] It was shown that the use of routine intra-operative ultrasound guidance during D&E reduced the rate of perforation.[15]

Cervical dilatation for surgical abortion in the second trimester

To ensure a safe D&E, adequate cervical dilatation is vital, which could be acquired with either mechanical or pharmaceutical agents.

One commonly used mechanical agent is *Laminaria*, which is a genus of brown algae. After dehydration and sterilisation, the stem of the seaweed forms a thin rod. When it is inserted into the cervical canal, it absorbs moisture and then expands, leading to the dilatation of the cervix. The major drawbacks include the need for overnight placement for adequate dilatation and the lack of uniformity with unpredictable dilatation in a natural product.[16] Lamicel, a synthetic osmotic dilator, is a sterile tent of dehydrated polyvinyl alcohol impregnated with 450 mg $MgSO_4$, which absorbs water and swells fourfold in diameter after 4 h, with faster action than *Laminaria*. However, Skjeldestad et al. reported only about half of the Lamicel remained in place after overnight insertion, whereas the other half was partially displaced or completely expelled in first-trimester abortion.[17] Lamicel is effective for cervical ripening with insertion of few hours in surgical abortion of gestations up to 16 weeks.[18,19] When used overnight, Lamicel is effective up to 17 weeks of gestation.[20] Dilapan-S is a hygroscopic cervical dilator that is manufactured from an aquacryl, a proprietary hydrogel. There are three different sizes available and the manufacturer recommends overnight insertion for second trimester abortion with more than one dilator according to gestation. It continues to expand over 24 h, although it can achieve 10-mm dilation after 2–4 h of insertion. There are no published data on the direct comparison between Dilapan and Lamicel.

Prostaglandin (PG) analogues, specifically the PGE1 analogue, misoprostol, are often used as an alternative or an adjuvant for cervical ripening. Various routes of administration were studied. Adequate cervical preparation was achieved in 32 women between 14 and 16 weeks of gestation with 600 μg of buccal misoprostol 2–4 h prior to D&E.[21] A randomised, double-blinded, controlled trial comparing 400 μg of vaginal misoprostol, given 3–4 h preoperatively, with overnight *Laminaria* at 13–16 weeks of gestation showed that significantly faster procedures and greater preoperative dilatation were achieved with *Laminaria* than with misoprostol. More patients in the misoprostol group required additional manual dilatation.[22] Edelman et al. reported a randomised trial of preoperative cervical preparation with overnight *Laminaria* and either buccal placebo or 400 μg buccal misoprostol approximately 90 min before second trimester surgical abortion. It showed misoprostol treatment did not improve the initial mean dilatation achieved with *Laminaria* alone in either gestation of 13–15-week or 16–20-week groups, while a sub-analysis of gestations 19 weeks or more demonstrated significantly greater dilatation in the misoprostol group. Subjects receiving misoprostol reported significantly more cramping than those receiving placebo.[23]

Mifepristone, an antiprogestin, though not widely available in many countries, is a potentially effective cervical ripening agent. Its use together with misoprostol, either orally or sublingually, was proved to be more effective, in terms of the average cervical dilatation and shorter operative time than misoprostol in either route alone.[24] However, mifepristone is expensive and not available in many countries. Therefore, from the available data, the preoperative insertion of intracervical tents appears to be the method of choice

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in dilating the cervix before D&E in pregnancies less than 19 weeks. In more advanced pregnancies, the combined use of intracervical tents and misoprostol may be more appropriate.

Medical abortion

Medical abortions in the second trimester are widely employed worldwide, especially where surgical expertise is not available. The popular methods three decades ago include the use of intrauterine instillation of hypertonic saline, rivanol or hyperosmolar urea. As these methods are invasive and may be associated with serious complications such as disseminated intravascular coagulation, they are seldom used nowadays[25] although they are still used in some developing countries, such as Uzbekistan, as reported by Kapp et al. A randomised trial reported by Kapp et al. showed that when compared with misoprostol alone, the use of intrauterine hypertonic saline plus a PG F2 analogue was associated with a significantly longer procedure time and significantly more complications, such as retained placenta and haemorrhage. Both providers and patients gave a higher procedural satisfaction score to the misoprostol method and the authors suggested adopting the misoprostol method.[26]

Oxytocin is frequently used as an induction agent at term gestation and its use in second trimester abortion has also been studied. A prematurely terminated randomised trial showed a significantly shorter induction-to-delivery interval and a higher induction success rate in the group using misoprostol 600 μg followed by 400 μg every 4 h for five doses, compared with the escalating dose-concentrated oxytocin infusions plus vaginal misoprostol 400 μg, then 200 μg every 6 h and then 100 μg. [27] Another regimen of 200 mg of mifepristone orally between 36 and 48 h before the vaginal administration of 800 μg of misoprostol, together with amniorrhexis and intravenous oxytocin infusion was studied in a descriptive study with 428 women of gestation between 19.1 and 25.6 weeks. Complete abortion occurred in 90.4%, while 9.6% of patients required D&E with a uterine rupture in one woman with a previous caesarean section noted.[28]

Medical abortion with PGs

A breakthrough in the field of medical abortion is the development of PGs and their analogues. The natural PGs were less effective than their analogues and their use was also associated with a higher incidence of side effects. PGF analogues were also associated with a high incidence of gastrointestinal side effects and they were often given intra-amniotically to reduce the incidence of side effects. They are now mostly replaced by the PGE analogues.

Sulprostone, a 16-phenoxy-w-17,18,19,20-tetranor PGE_2 methyl sulphonylamide, was used in the 1990s for second trimester abortion. It can be given intramuscularly. It was as effective as carboprost (15 methyl $PGF_{2\alpha}$ analogue) but the incidence of side effects was less. However, it was withdrawn from the market due to its association with myocardial infarction caused by coronary spasm.[29]

The most commonly used PG analogues for second trimester abortion nowadays are the PGE_1 analogues, namely misoprostol (15-deoxy-16-hydroxy-16-methyl PGE_1) and gemeprost (16,16,-dimethyl-trans-d2-PGE_1 methyl ester). Both of them are effective in second trimester abortion. A number of randomised trials have been conducted to compare these two analogues. A systematic review of six randomised trials on the use of vaginal misoprostol compared with gemeprost revealed similar efficacy, whereas misoprostol was associated with reduced narcotic analgesia requirement and surgical evacuation of the uterus.[30] However, different regimens of misoprostol were used in many of the trials included in this systematic review. There was evidence that the regimen of vaginal misoprostol 400 μg every 3 h is, in fact, more effective than the standard gemeprost regimen of 1 mg every 3 h. In a study comparing 400 μg of vaginal misoprostol every 3 h with 1 mg of gemeprost every 3 h, the induction-to-abortion interval was significantly shorter in the vaginal misoprostol group.[31] Another randomised trial comparing the same regimens of misoprostol and gemeprost also showed that women in the misoprostol group aborted earlier, while there was more pyrexia in the gemeprost group.[32]

There are additional advantages to using misoprostol over gemeprost. Misoprostol is cheap and stable at room temperature, while gemeprost must be stored below −10 °C. These properties make misoprostol particularly attractive in developing countries. Therefore, misoprostol is the PG of choice in medical abortion. However, in many countries, only gemeprost, but not misoprostol, is registered for

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termination of pregnancy. While this should not prevent the off-label use of misoprostol in many countries, the patient should be fully informed and consent should be obtained from her before using misoprostol for termination of pregnancy.

Regimens of misoprostol

Various regimens of using misoprostol have been studied.[33] A randomised trial compared three regimens of misoprostol: 200 μg misoprostol at 6-h intervals, 400 μg misoprostol at 6-h intervals and a loading dose of 600 μg misoprostol followed by 200 μg at 6-h intervals. The results showed that among these three regimens, the preferred regimen for intravaginal misoprostol was 400 μg at 6-hintervals as it was associated with a shorter commencement to abortion interval than the 200 μg regimen and fewer maternal side-effects than the 600 μg loading dose regimen.[34] However, two other randomised trials showed that the regimen of vaginal misoprostol 400 μg every 6 h is less effective than vaginal misoprostol every 3 h. Both trials compared the regimen of 400 μg vaginal misoprostol every 3 h up to a maximum of five doses with the regimen of 400 μg vaginal misoprostol every 6 h up to a maximum of three doses in 24 h. Both trials showed significantly shorter induction-to-abortion interval in the 3-hourly regimen, with a higher incidence of fever in one trial.[35,36] Therefore, the 3-hourly regimen was probably the most optimal.

Although misoprostol was licensed for oral use, various studies showed that it is also effective when given by other routes. The intravaginal route of administration was shown to have a shorter induction-to-abortion interval compared with the oral route in a small prospective study, while the overall success rates were similar in the two groups.[37] Using vaginal administration of misoprostol alone was shown to have a significantly shorter mean induction-to-delivery interval (19.6 ± 17.5 h vs. 34.5 ± 28.2 h, $P < 0.01$) and shorter length of hospital stay (32.3 ± 17.3 h vs. 50.9 ± 27.9 h, $P < 0.01$) when compared with oral administration. There was an increase in febrile morbidity in the vaginal group (25% vs. 6.7%, $P = 0.046$).[38] The vaginal route was also showed to be more effective than the oral route after mifepristone priming.[33] There was also a reduction in the incidence of side effects. However, more women preferred the oral route.

Because of the preference of women for the oral route, the alternative of sublingual administration of misoprostol was investigated. A pharmacokinetic study showed that after sublingual administration, misoprostol was absorbed more rapidly than after vaginal administration and the peak serum level as well as the area under the time concentration curve of misoprostol acid, the active metabolite of misoprostol, were significantly higher than those after oral or vaginal administration. However, the serum levels of misoprostol acid were maintained for a longer period after vaginal administration than with oral or sublingual administration.[39] A subsequent study on the pharmacokinetics of misoprostol after either vaginal or sublingual administration of repeated doses of misoprostol every 3 h showed that after vaginal administration, the serum levels of misoprostol acid were slightly higher in the vaginal group after 3 h, if there was no significant bleeding. If there was significant bleeding, the serum levels of misoprostol acid declined despite repeated doses. This is probably due to the impaired absorption of misoprostol when there was significant bleeding. A prospective randomised trial of 120 women at 12–20 weeks of gestation comparing sublingual with oral misoprostol (400 μg every 3 h for a maximum of five doses) 36–48 h after 200 mg of mifepristone showed no significant difference in the success rate at 24 h with 91.4% in the sublingual group and 85.0% in the oral group, but the median induction-to-abortion interval was significantly shorter ($P = 0.009$) in the sublingual group. The incidence of fever was higher in the sublingual group. The incidence of other side effects was similar in both groups.[40] A randomised trial comparing the efficacy of vaginal or sublingual misoprostol showed that the abortion rate at 24 h was significantly higher in the vaginal group.[41] Another randomised controlled trial comparing vaginal administration versus sublingual administration by the World Health Organization (WHO) also showed a higher effectiveness in the vaginal route (85.9%) than sublingual administration (79.8%) in terminating second trimester pregnancies, but this result was mainly driven by nulliparous women at 24 h. Fever was more prevalent with vaginal administration.[42] The results of all these trials indicate that the most effective route for administration of misoprostol for termination of second trimester pregnancy was vaginal. Sublingual administration

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can be considered if there is contraindication to the vaginal administration or if there is significant vaginal bleeding.

Mifepristone, an antiprogesterone, is the only anti-progestin approved for induction of abortion. However, only 0.2% (2 out of 956) women aborted after mifepristone alone without gemeprost within 36 h in one review.[43] The low efficacy of mifepristone being used alone was confirmed by another descriptive study.[44] Since it can sensitise the uterus to the action of PGs, it is used nowadays mainly in combination with PGs in induction of second trimester abortion. The effectiveness as a combination regimen with the two PGE_1 analogues was well proven by various studies.[40,45–47]

The use of cervical ripening agent

The use of misoprostol as a cervical priming agent for second trimester abortion, as a single dose of 50 μg of misoprostol given buccally for 30 min the evening prior to induction, was reported by one descriptive study, which included 19 women only. It showed that the median time from first dose of misoprostol expulsion was 9.4 h compared with the historical cohort of 14 h.[48] The insertion of a *Laminaria* tent 12 h before the administration of sulprostone has been shown to be effective in reducing the induction-to-abortion interval.[49] However, the *Laminaria* tent did not shorten the induction-to-abortion interval when the abortion was induced with vaginal misoprostol.[50] Mifepristone is a highly effective ripening agent. It can shorten the abortion process induced by PGs if it is given 36–48 h before the administration of PGs. Reducing the interval between mifepristone and PG to 24 h or less will lead to a significant increase in induction-to-abortion interval.[51–53] The dose of mifepristone can be reduced from 600 to 200 mg without loss of its efficacy.[54,55] Mifepristone 600 mg given 48 h before vaginal gemeprost was shown to be more effective in shortening the induction abortion interval than the *Laminaria* tent inserted 12 h before the administration of vaginal gemeprost.[56] Another randomised trial comparing mifepristone with *Laminaria* tent before vaginal misoprostol showed that the induction-to-abortion time was significantly shorter in the mifepristone arm (mean, 10 h vs. 16 h, $P = 0.01$). Pain with cervical ripening was also significantly less in the mifepristone group than in the *Laminaria* group.[57] Therefore, the available evidence shows that mifepristone is the drug of choice for priming the cervix and uterus in second trimester medical abortion. Unfortunately, it is still not available in many countries.

Recommended regimens

When mifepristone is available, the recommended regimen is 200 mg mifepristone followed by 800 μg of vaginal misoprostol 36–48 h later. Subsequent doses of 400 μg of misoprostol can be given orally every 3 h up to a maximum of four more doses.[58] Other PG analogues such as gemeprost can be used if misoprostol is not available. When mifepristone is not available, misoprostol can be used alone to induce abortion but the induction-to-abortion interval may be longer. Many regimens using misoprostol alone have been found to be effective. From the results of the various clinical trials, the regimen of 400 μg of vaginal misoprostol every 3 h up to a maximum of five doses appears to be an effective regimen without a very high incidence of side effects.[33] As a recent pharmacokinetic study showed that the absorption of vaginal misoprostol might be impaired in the presence of significant vaginal bleeding, misoprostol may be given orally or sublingually if the patient developed heavy bleeding. If the woman fails to abort after the completion of the first course of misoprostol, a second course of misoprostol can be given 12 h after the last dose of the misoprostol. Since the uterus is more sensitive to the action of PGs with increase in gestational age, a lower dose of PG or less frequent administration should be considered with pregnancies beyond 22 weeks. Medical abortion in pregnancies beyond 22 weeks may lead to the delivery of a potentially viable foetus. As recommended by the Royal College of Obstetricians and Gynaecologists (RCOG), intracardiac potassium chloride, one of the most commonly used foeticidal agents, should be used to induce foetal demise before medical abortion at $\geq$22 weeks gestation.[58] Potassium chloride is injected trans-abdominally under ultrasound guidance into the foetal cardiac ventricle or thorax. Digoxin, another commonly used foeticide, can be given by various routes, including injection into the amniotic fluid or other foetal tissues. Both agents were shown to be effective and safe.[59,60]

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Complication and risks

The most common side effects of PG analogues in second trimester abortion were nausea (64.7%), vomiting (22%) and chills (27.4%).[61] Fever was another commonly reported side effect, especially with misoprostol administration. The incidence was reported as 30–50% of women with 400 μg misoprostol every 3 h.[31] The probability of heavy bleeding requiring blood transfusion was 0.7%.[44]

A rare, but potentially life-threatening complication, is uterine rupture. Uterine rupture has been reported to occur in women undergoing second trimester abortion induced by either misoprostol or gemeprost.[62,63]

Pain relief

Abdominal cramping is common during second trimester medical abortion. Since some women would perceive pain as a very important factor in choosing the method of abortion, pain relief during abortion is of utmost importance. There are various reports regarding pain relief for abortion. A recent double-blind randomised controlled trial compared 500 mg paracetamol with 400 mg ibuprofen for pain relief with the regimen of 600 mg mifepristone orally followed by 400 μg of oral misoprostol 48 h later for first-trimester abortion. The investigators found no significant difference in the complete abortion rates, the mean pain score after misoprostol and no significant difference in the time of onset of pain. However, there was a significant difference between the two groups in mean pain scores after administration of the respective analgesics, with the ibuprofen group achieving greater reduction in pain compared with the paracetamol group. In addition, the number of women who asked for second-line analgesia (dipyrone) was significantly higher in the group that received paracetamol (26.5%) than in the group receiving ibuprofen (6.2%).[61] A retrospective analysis on the use of 3–4-hourly intramuscular diamorphine 10 mg in second trimester abortion between gestations of 12 and 20 weeks with the regimen of mifepristone and misoprostol showed that 76.2% of women needed diamorphine for pain relief, while 3.6% of women (14 out of 386) required more than two doses of 10 mg intramuscular diamorphine administration.[64] The use of intramuscular pethidine injection and epidural analgesia were also reported in second trimester abortion or medical induction for foetal demise in second or third trimester in 24% and 28% of patients,respectively.[65,66] Therefore, non-steroidal anti-inflammatory drugs can be used for pain relief without affecting the efficacy of the PGs in medical abortion. However, it is expected that some women will need narcotic analgesics for pain relief.

Post-abortion care

After abortion of the foetus, the placenta is usually delivered soon afterwards. If the placenta is still not delivered after 1–2 h, an intravenous oxytocin infusion may be set up to facilitate the expulsion of the placenta. After delivery of the placenta, it should be inspected carefully to assess whether it is complete. If it is incomplete, evacuation of the uterus should be performed. After delivery of the placenta, the patient should be observed for a few hours to monitor the amount of vaginal bleeding. During this period, future contraception can be discussed with the patient and appropriate advice can be given before the patient is discharged from the hospital.

Second trimester abortion in women with prior caesarean

With the increase in the incidence of caesarean for delivery for various reasons, there is an increased demand on performing abortion in women with prior caesarean. The safety issue and the relationship with uterine rupture are of great concern. Both medical and surgical methods for second trimester abortion were shown to be effective and safe.

Both misoprostol and gemeprost were found to be safe in this aspect. A small observational study in Egypt of over 50 women with one prior caesarean delivery undergoing abortion between gestations of 16 and 26 weeks showed the safety of the use of four doses of 200 μg of misoprostol applied vaginally every 4 h daily, with a 12-h nightly rest from misoprostol applications. The success rate of the regimen was 90% with no uterine rupture noted.[67] In a retrospective study using gemeprost 1 mg every 3 h for

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a maximum of five pessaries over 24 h, the overall success rate of abortion within 72 h was 98.4% in women with one to three prior caesarean deliveries. There was one case out of 67 having heavy vaginal bleeding requiring emergency surgical removal of placenta and blood transfusion. One patient at 20 weeks pregnancy with two lower-segment transverse caesarean sections required hysterotomy due to uncontrolled vaginal bleeding and hysterectomy during the procedures due to unresponsive uterine atony.[68] A small case series of 15 women with one to two prior low transverse caesarean deliveries having second trimester abortion between gestations of 16 and 28 weeks revealed no uterine rupture without specifically describing the regimen. There was one uterine rupture among the two women with previous classical caesarean deliveries. The authors also performed a systematic review, which showed the incidence of uterine rupture was 0.4% in women with one prior low transverse caesarean delivery.[69] Another systematic review estimated that the risk of uterine rupture among women with a prior caesarean delivery undergoing second trimester abortion using misoprostol is 0.28% (95% confidence interval (CI) 0.08–1%) after pooling results of 16 studies, including 3556 patients with three uterine ruptures noted.[70] In the case series of 91 women, it was also shown to be safe to use *Laminaria* with D&E in women with one or several prior caesarean deliveries for second trimester abortion of gestations 17–24 weeks with no uterine rupture reported.[71]

How to choose the method

Both surgical and medical methods for second trimester abortion are safe and effective. However, the choice of the method very often depends on the availability of the surgical expertise in performing D&E as well as the preference of the physician in charge. The choice of the method greatly varies in different localities. For instance, in US, D&E is used in over 96% of second trimester abortions,[2] while in North Europe, namely Finland and Sweden, and China, almost all second trimester abortions were performed medically.[72] In a retrospective cohort study in US, where D&E was used in over 96% of patients, the overall complication rate was significantly lower in patients who underwent D&E than in patients who underwent medical abortion (4% vs. 29%; $P < 0.001$). Medical abortions with misoprostol resulted in a lower complication rate than abortions with other medications.[10] There was one randomised trial comparing D&E with the modern medical method of mifepristone followed by misoprostol. However, the study was stopped prematurely at 1 year because of slow enrolment with only 18 women participating. The regimen of mifepristone–misoprostol abortion caused more pain and adverse events such as fever in three patients (33.3%). Three patients required surgical removal of the placenta in the mifepristone–misoprostol group for retained placentae, while one patient required suction curettage 6 days after abortion for retained products of conception.[73] A recent Cochrane review showed D&E was related to a lower combined incidence of minor complications than intra-amniotic instillation of $PGF_{2\alpha}$ (odds ratio (OR) 0.17, 95% CI 0.04–0.65), as was the total number of minor and major complications (OR 0.12, 95% CI 0.03–0.46). The number of women experiencing adverse events was also lower with D&E than with mifepristone and misoprostol (OR 0.06, 95% CI 0.01–0.76). Although women treated with mifepristone and misoprostol reported significantly more pain than those undergoing D&E, efficacy and acceptability were the same in both groups.[74] However, there was only a single randomised trial comparing D&E with the mifepristone and misoprostol regimen and the number of patients in this trial was small. Therefore, further randomised trials with a larger number of patients are needed.

Specialised training and the maintenance of an adequate caseload are required to perform D&E safely. Inexperienced providers are advised to use medical methods.[58] From a survey of National Abortion Federation members (NAF) in North America and Australia, 72% of NAF clinics offer second trimester abortion services. The majority of second trimester providers are obstetricians/gynecologists (63%), male (62%) and at least 50 years old (63%). What raised their concern was the ageing of skilled practitioners, which may affect the future availability of second trimester abortion.[75]

If the surgical expertise of D&E is available, both surgical and medical methods should be offered to the women who request second trimester termination of pregnancy and let them make their own choice based on the information provided and their acceptance. However, if the surgical expertise for D&E is not available, medical treatment should provide a safe option in case of second trimester abortion.

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Conclusion

D&E is the surgical method of choice for second trimester abortion but it requires gynaecologists, who have been properly trained, appropriate instruments and adequate caseload to maintain the skill. The combination of mifepristone and misoprostol is the regimen of choice for medical abortion in the second trimester. Both D&E and the mifepristone/misoprostol medical abortion are safe and effective. The choice will depend on the availability of the appropriate facilities and expertise. If possible, the wish of the patients should also be taken into consideration.

Larger trials on the direct comparison of misoprostol with mifepristone versus D&E should be carried out to elucidate the choice of method to provide second trimester abortion. Although the combination of mifepristone and misoprostol is a safe and effective option, mifepristone is not widely available. Other potentially useful agents should be explored to provide alternatives for mifepristone.

Practice points

- Proper preoperative assessment is a prerequisite for the provision of safe second trimester abortion, no matter which method is used.
- D&E is the method of choice for surgical abortion in the second trimester. Adequate preoperative cervical dilatation with intracervical tents with or without misoprostol is essential to reduce the risk of complications.
- To provide a safe D&E, adequate training of the gynaecologists is vital. It is also important to have the appropriate instruments and an adequate caseload to maintain the surgical expertise.
- The regimen of mifepristone followed by misoprostol is the method of choice for medical abortion in the second trimester.
- Misoprostol alone may be used if mifepristone is not available, although it is associated with longer induction-to-abortion interval and more side effects.
- Both surgical and medical methods, if available, should be discussed and offered to patients requesting second trimester abortion.
- If surgical expertise for second trimester abortion is not available, medical abortion with misoprostol with or without mifepristone should be offered.

Research agenda

- Larger randomised trials on the comparison of medical abortion with misoprostol together with mifepristone and D&E.
- Trials on other agents potentially useful for medical abortion.

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