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Chapter

Endoscopic Approach to Ectopic Pregnancy

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Abstract

Minimally invasive surgery is an option in the management of ectopic pregnancy, it may be rupture, not rupture, or complement of medical treatment. In addition to the known advantages of endoscopic surgery in the field of obstetrics, it allows better conservative management of the fallopian tube and ovaries, allowing a better reproductive prognosis. The surgical technique to be performed of the clinical findings, the hemodynamic status, and the anatomical location of the ectopic pregnancy. Salpingectomy is performed in the ruptured ectopic pregnancy, assessing the integrity of the contralateral salpinge. Linear salpingostomy is performed on unbroken ectopic pregnancy preserving the fallopian tube, in the literature, this technique has reported maintenance of the fertility rate. In case of a cervical or niche ectopic pregnancy, resectoscopy is recommended.

Keywords: ectopic pregnancy, laparoscopic surgery, hysterocopic procedures

1. Introduction

Ectopic pregnancy occurs in 0.6–2.1% of all pregnancies. Its prevalence in emergency services is 18%, and it is associated with abdominal pain and transvaginal bleeding. It leads to 2.7–5% of maternal deaths in developed countries, and it is also the main cause of death in the first trimester. Death results mainly from ectopic pregnancy rupture. The frequency of ectopic pregnancy is 90–97% in the uterine tube, 1–3% in the ovary, the same percentage is in the niche or cesarean section scar, 1% are abdominal, and 1% are interstitial or located in the horn, as well as cervical, post-hysterectomy, in the rudimentary horn due to Müllerian malformation, and heterotopic or atypical implantation is present in less than 1% of cases. Ectopic pregnancies in atypical locations are a surgical challenge, associated with a high risk of hemorrhage and death, and should be managed in a tertiary care medical center with experience in the treatment of this entity.

Management by laparoscopy and hysteroscopy is currently the most recommended approach; these minimally invasive procedures aid in the preservation of reproductive function, allowing an intrauterine pregnancy within 2 years after conservative surgery in 70% of cases.

2. Endoscopy in gynecology

The implementation of endoscopic surgery in surgical practice is one of the most successful innovations in the history of medicine. The first laparoscopy in a human being was performed by Hans Christian Jacobaeus, who coined the term "laparoscopy," and in 1910 he described the technique to inspect peritoneal, thoracic, and pericardial cavities in humans [1].

Over the following four decades, gynecological laparoscopy was greatly promoted and developed by Raoul Palmer and Hans Frangenheim, who routinely performed the procedure, and the first book on surgical techniques in laparoscopy was published by Patrick Steptoe in 1967. Initially, gynecological laparoscopy was mainly used to establish diagnoses, and its only surgical applications were uterine tubal ligation and fenestration of benign ovarian cysts. Its progressive development, particularly in the last two decades, has placed this surgical technique as the first-line therapeutic approach in gynecological surgery since the same procedures as in open surgery can be performed to manage uterine tubes, ovaries, and corpus uteri pathology; it is also of use in pregnant patients with appendicular, gallbladder, and adnexal disease and in all variants of ectopic pregnancy. It is also the diagnostic and therapeutic gold standard in the management of endometrial pathology [1–6].

Minimally invasive surgery has many advantages in gynecology since it can be performed in girls, adolescents, women of reproductive age, pre and postmenopausal females, including those with obesity; postoperative results include less pain, shorter hospital stays, faster recovery, a decrease in the risk of developing adhesions, a superior esthetic outcome, greater fertility preservation, and the ability of the patient to engage more rapidly in their work and daily activities with less labor disability periods than cases who undergo open surgery. In-office and surgical hysteroscopy is one of the most significant advances in gynecology and has revolutionized the management of intracavitary uterine pathology [7, 8].

Complications of endoscopic surgery in gynecology occur in 3 to 6 cases per 1000 procedures. Half of them appear when introducing the trochars or the hysteroscope, followed by events derived from the use of energy. New entry techniques, materials, and endoscopic equipment have not modified this frequency in the last two decades, but it varies in accordance with the surgical group's experience [1].

3. Endoscopic management of ectopic pregnancy

Surgical management of ectopic pregnancy is the option in patients that are not candidates for expectant or pharmacologic management. The choice between laparoscopy and laparotomy depends on the patient's clinical features, the physician's experience in endoscopic techniques, and the available hospital resources. When possible, an endoscopic approach in the management of this pathology is preferable since there is sufficient evidence of its feasibility and greater preservation of organ function [9–11].

Ectopic pregnancy is specifically managed according to the implantation site that may be: tubal, interstitial, ovarian, abdominal, cervical, or heterotopic.

4. Tubal pregnancy

Ectopic pregnancy in the uterine tube is located in the ampulla in 70–80% of cases, in the fimbriae in 11%, and 10–12% are implanted in the isthmic portion. The intramural or interstitial portion is considered a separate entity [9, 11, 12]. In any of these clinical presentations, women prefer conservative surgical management, and preservation of the uterine tube, despite an increased risk of ectopic pregnancy recurrence, or its persistence [9–11].

According to the ACOG and NICE guidelines, an ectopic pregnancy with a detectable heart rate by ultrasound, an adnexal mass larger than 35 millimeters, a β-hCG fraction of 5000 IU/L, severe abdominal pain, signs and symptoms suggesting ectopic pregnancy rupture, hemodynamic instability, intra-abdominal bleeding, and/or medical treatment failure are all obligate indications of surgery [11].

The laparoscopic surgical techniques in the uterine tube include:

Salpingotomy: This refers to a linear incision on the uterine tube exactly over the ectopic pregnancy on the anti-mesosalpinx border. The uterine tube wall is previously injected with diluted vasopressin (0.2 UI/ml of saline), the longitudinal incision is created with scissors or bipolar energy, and should measure 10–20 millimeters; the embryo and trophoblastic tissue are extracted through the incision by hydrodissection and/or blunt dissection, the surgical site should then be thoroughly washed with anti-adherent solutions, hemostasis should be carefully performed, and the incision closed with absorbable 4/0 sutures [12].

Linear salpingostomy: This is the same procedure as salpingotomy but without suturing the incision.

Salpingectomy: This is the only radical or nonconservative management of the uterine tube and implies the removal of a segment or the entire uterine tube; it is warranted if the uterine tube ruptures, a complication of the previously mentioned techniques, or if further pregnancies are unwanted. This technique may be converted into conservative management if complemented with anastomosis of the uterine tube segments, to preserve function.

Fimbrial milking refers to the nontraumatic compression of the fimbriae to promote trophoblastic expulsion.

Regardless of location, the success of conservative management will be greater if the diagnosis is timely and precedes rupture symptoms [10, 13].

Salpingotomy is recommended in patients wishing to preserve their fertility butare at risk of infertility due to injury in the contralateral tube secondary to pelvic inflammatory disease, or recurrent ectopic pregnancy in the same salpinx; the procedure is feasible in 96% of cases, it is safe, with almost a zero percentage of complications [10]. Its disadvantages include: it requires β-hCG follow-up after surgery to ensure the resolution of the ectopic pregnancy, it carries a greater risk of ectopic pregnancy persistence that may require postoperative treatment in 7% vs. <1% after salpingectomy (RR 15.0; 95% CI 2.0–113.4), and a possible increase in the risk of ectopic recurrence that in the literature, varies between a RR of 2.27 (95% CI 1.12–4.58; p = 0.02) to 1.04 (95% CI 0.89–1.21; p = 0.61) [9, 14].

Salpingectomy is recommended when there is an extensive injury to the involved salpinx while the contralateral salpinx is intact, and the patient wishes to remain

fertile [11]; it carries a lower risk of ectopic persistence, surgical reintervention, and recurrence. Its disadvantage is a decrease in fertility in women with a contralateral injured tube or the presence of pelvic adhesions (40 vs. 75%; p < 0.005) [9, 15].

Segmental resection with anastomosis is the recommended procedure in isthmic pregnancy (12% of ectopic pregnancies), since the muscular portion is compact and rapidly invaded by the trophoblast, leading to two significant risks: early rupture and persistence of the trophoblast, as well as sequelae due to structural injury upon removal. This approach requires microsurgical techniques and experienced surgeons [13].

Fimbrial milking or expression is a procedure used in pregnancies implanted in the distal portion of the uterine tube (fimbriae). It is evacuated by compressing the fimbriae with nontraumatic instruments, in the direction of the uterus toward the fimbriae, even with tempered glass atraumatic mobilizers. This technique requires follow-up to exclude the persistence of trophoblastic tissue [10].

In daily practice, the choice between a salpingectomy and a salpingostomy entails patient and physician factors. The patient factors include age, the desire to remain fertile, the obstetric history, previous surgeries, the condition of the involved, and the contralateral tubes. From a medical perspective, the physician's experience in endoscopic surgery and his/her preference, are pivotal.

When conservatively managing the uterine tube, hemorrhage control at the implantation site resulting from the removed tissue is a key, as well as control of post-incision bleeding, for if persistent, a salpingectomy will be required; for this reason, 20% of salpingostomies require conversion into a salpingectomy.

The recommended hemostatic techniques are: direct compression over the surgical site with endoscopic forceps, cauterization with bipolar energy, ligation of the mesosalpinx and bleeding vessels with 6/0 polyglactin, application of hemostatic sealants, and segmental resection with anastomosis of the compromised segment [10, 12].

Direct compression tends to be insufficient while electric energy must be cautiously used to avoid desiccation of the surgical site, since the thermal injury of the mesosalpinx may be permanent and irreversible. If choosing bleeding blood vessel ligation, one must avoid the involvement of the collateral vasculature. Hemostatic sealants must not be used in excess since they may compromise the healing process, and alter the functionality of the tubal epithelium. One must remember that the milder the injury to the tissue, the less formation of adhesions.

When following conservative management, the risk of persistence of trophoblastic tissue may reach 20% but can be decreased with 2% intramuscular prophylactic methotrexate (RR 0.89, 95% CI 0.82, 0.98) [16].

Although there is a tendency to follow conservative management to improve future fertility, no statistical difference has been reported using a particular technique, especially when attempting a subsequent intrauterine pregnancy.

5. Interstitial or horn pregnancy

The terms interstitial pregnancy or horn pregnancy are used indistinctly in the literature to refer to the implantation of the gestational sac in the uterine horns or the proximal portion of the uterine tube (intramural); however, some authors consider that the term "horn pregnancy" should be reserved for gestation in the horn of a bicornuate uterus. The interstitial portion of the uterine tube is that crossing the

myometrium to the endometrial cavity; its diameter is 0.7 millimeters and measures 1–2 centimeters in length [17, 18].

The frequency of interstitial pregnancy ranges between 2 and 4% of all ectopic pregnancies, and carries a seven-fold increase in morbimortality compared with other types of tubal pregnancies; this results from the pregnancy's asymptomatic nature until weeks 7 to 16, and that is later suddenly manifested as a massive intraperitoneal hemorrhage, pain, and shock. Its incidence has increased in the past two decades as a result of pelvic inflammatory disease, assisted reproduction techniques, the use of intrauterine devices, adhesions, and previous tubal surgeries [19, 20].

Three therapeutic approaches have been described: close surveillance of the ectopic pregnancy if not associated with hemodynamic instability, medical management, and surgical management. The choice hinges on various factors such as the patient's clinical status, the gestational age at the time of diagnosis, the presence of contraindications of medical treatment, and the patient's preference [21].

An expectant approach (surveillance) is reserved for patients with decreasing β-hCG levels and that remain clinically stable. Medical treatment with local and/or systemic methotrexate is indicated in young nulliparous women wishing to preserve their future fertility if the interstitial pregnancy has not ruptured, if the gestational sac measures 35 mm or more in diameter, a β-hCG level of 5000 mUI/mL or below, and the absence of embryonic cardiac activity; the rate of success is 80% [21–24].

Surgical approaches include: hysteroscopy, laparoscopy, and laparotomy. Surgery is recommended in symptomatic cases that are hemodynamically unstable, and at risk of rupture of the ectopic mass; also, in pregnancies over 7 weeks, gestational sacs ≥35 mm in diameter, when the use of methotrexate is contraindicated or has failed, and according to the patient's preference and the surgeons' expertise [19, 24].

The most frequent approach used to be a laparotomy with horn resection and/or hysterectomy, due to delayed diagnoses, in patients with uterine rupture, hemorrhage, and instability. Currently, this remains an option in the absence of a surgeon with laparoscopic training. Now, the first option is conservative laparoscopy since it is associated with lower blood volume loss, a shorter operative duration, shorter hospital stays, faster recovery, and preservation of the anatomy, even in cases of uterine rupture and hemoperitoneum [23–25].

The endoscopic options are: laparoscopic horn resection, wedge horn resection (in combination with an ipsilateral salpingectomy), hornostomy/salpingostomy (incision in the horn region, and removal of the gestational sac or horn evacuation), and mini-horn excision. The most frequently used and described techniques are laparoscopic horn excision and hornostomy [21, 24, 26].

Less radical techniques that conserve the anatomy such as hornostomy, salpingostomy, and horn mini-excision are performed when the tumor formed by the ectopic implantation of the gestational sac is smaller than 40 millimeters in diameter, there is no rupture nor embryonic cardiac activity, the patient wishes to preserve her future fertility, or the contralateral tube is absent or injured. There is no evidence of subsequent successful pregnancies, but there is a risk of persistent ectopic pregnancy in 5–15% of cases [19, 24].

More radical techniques are preferred such as wedge horn resection with salpingectomy in cases of tumors formed by the ectopic implantation of the gestational sac greater than 40 millimeters in diameter, and in the presence of rupture or embryonic cardiac activity [24]. Between horn resection and laparoscopic hornostomy, there are no significant differences in postoperative hemoglobin level,

persistence of the ectopic pregnancy, complications, but only in the duration of surgery, favoring hornostomy [27].

Despite the different laparoscopic techniques, there is no consensus on which is superior, and the most frequent injury is intestinal, due to electrocautery. Vasopressin or a myometrium vasoconstrictor can be injected around the ectopic site to minimize bleeding and obtain hemostasis [24, 28].

There are case reports of hysteroscopic extraction of horn pregnancies, with or without previous methotrexate administration. To evacuate the gestational sac, graspers or forceps are used. Follow-up is based on ultrasound, hysteroscopy, and β-hCG determinations for 3 months [29, 30]. Hysteroscopic management is recommended in horn pregnancies measuring less than 40 millimeters in diameter; if the embryo has no cardiac activity, this approach has greater chances of success with average blood loss of 30 milliliters, but the technique should be limited to groups with expertise in the field [31].

6. Ovarian pregnancy

Ovarian pregnancies account for 0.5–3% of all ectopic processes. Seventy-five percent end in the first trimester and they are often mistaken for a corpus luteum or a tubal ectopic pregnancy by ultrasound.

The clinical presentation is abdominal pain (93%) with scant transvaginal bleeding, and the diagnosis is corroborated at the time of laparoscopy. Management options include wedge resection, sac resection from the ovarian tissue, blunt dissection of trophoblastic tissue (with bipolar energy), and in extreme cases, oophorectomy [9].

Ovarian wedge resection consists in removing the ovarian portion fixed to the ectopic pregnancy; bipolar energy is recommended without suturing the ovarian edges. Hemostasis is obtained with bipolar energy, but in cases of persistent bleeding, an absorbable 2/0 suture should be used.

The gestational sac may be removed from the ovarian surface by hydrosection, or blunt dissection, and complemented with bipolar energy to release trophoblastic tissue or control bleeding on the ovarian surface.

Oophorectomy is reserved for cases in which there is ovarian parenchymal rupture and massive hemorrhage, advanced pregnancies, or a ruptured ectopic pregnancy with infiltration into the ovarian parenchyma.

A laparoscopic approach is recommended over an open technique since it permits greater preservation of the ovarian tissue [11, 32].

7. Abdominal pregnancy

It accounts for 0.1 to 1.3% of all ectopic pregnancies; implantation may occur anywhere in the abdominal cavity, although it is more frequent in the posterior cul-de-sac (approximately 50%), followed by the mesosalpinx (27%). They have also been reported on the omentum, intestine, mesentery, pelvic peritoneum, anterior cul-de-sac, liver, spleen, diaphragm, retroperitoneum, abdominal wall, inferior vena cava, and aorta; however, the entire cavity is at risk of implantation [13, 33].

This type of pregnancy has an eight-fold increased risk of leading to death than tubal pregnancies since it is difficult to diagnose and treat. It is frequently a transoperative finding triggered by clinical signs of an acute abdomen, there is free blood in

the abdominal cavity, the presence of an abdominal tumor, or even a fetus associated with an empty uterus on ultrasound.

For study purposes, it can be divided into primary and secondary: primary refers to pregnancies that from the beginning are implanted in the abdominal cavity, while the secondary types are implanted in the abdominal cavity after an extraction procedure or detachment from the site of origin in the genital tract. It has also been divided according to the moment of interruption: early, if it occurs before week 20, or late if the pregnancy culminates after that week [11, 32].

Trophoblastreimplantation after removal of a primary ectopic pregnancy by laparoscopy or laparotomy has a frequency of 1–1.9%. To prevent this, it is important to remove all pathological tissue during surgery as well as clots, to decrease the possibility of leaving reimplantation tissue behind. The Trendelenburg position is recommended as well as the complementary administration of methotrexate [34].

When an early pregnancy is suspected, the recommended treatment is methotrexate, even if the implantation site has not been established; this is followed by laparoscopic excision.

In pregnancies beyond 8–10 weeks of gestation, and at imminent risk of hemorrhage, the decision to perform open or laparoscopic surgery will depend on the time of diagnosis and the patient's clinical status. Manipulation of the placenta and/or placental bed tends to be lethal so the cord must be ligated as close to its insertion as possible and its management should be expectant. The risk of bleeding due to removal must be well evaluated since hemorrhaging of the placental bed results from its location in a tissue that does not contract like the uterus to staunch the bleeding. Within the expectant management, also consider the risk of infection, the possibility of bleeding, and the need for reintervention; the approach should be multidisciplinary [9].

8. Heterotopic pregnancy

It is defined as the simultaneous presence of an intrauterine and an extrauterine pregnancy; it is a very unusual variant with a frequency of approximately 1 in 30,000 spontaneous pregnancies, or 1 in 1111 pregnancies, and tends to result from fertility issues. The most frequent location is the uterine tube but it may also be located in the horn, cervix, niche, or the abdomen [9].

Management of the uterine tube will be the same as in tubal single pregnancy, but salpingectomy is the most frequently reported approach. In other sites, instead of using methotrexate that is contraindicated due to the intrauterine pregnancy, an intracardiac injection of potassium chloride is administered. Management options will depend on the patient's preferences, her clinical conditions, and the physician group's experience. After resolution, the patient requires close follow-up [9, 11].

A complication of laparoscopic treatment is the persistence of trophoblast tissue so β-hCG levels must be followed from day 5 to 10, and if they decrease $\geq$93.1%, the possibility of persistence is extremely low [35].

9. Cervical pregnancy

Cervical pregnancy has a frequency of 0.1% of all ectopic pregnancies, but its incidence varies from 1 in 1000 to 1 in 18,000 in the literature. Since its etiology is unknown, consider risk factors such as previous dilation and curettage in a previous

pregnancy (70% of cases), a previous cesarean section, cervical surgery, and endometritis. Its most common symptom is usually profuse vaginal bleeding, and the diagnostic suspicion should be corroborated by high-resolution ultrasound [36–38].

This type of ectopic pregnancy carries a high risk of massive hemorrhage during abortion labor or during attempts at surgical evacuation; it may even lead to definitive treatment such as an emergency hysterectomy.

Conservative management of the cervical ectopic pregnancy with hysteroscopy was first described in 1996 by Ash and Farrel. It must be performed before the 8th week, there must be no embryonic vitality, and it warrants the use of methotrexate [36, 39, 40].

Hysteroscopic treatment is effective and safe but requires two conditions: if the embryo is alive, the uterine arteries must first be ligated or embolized. If it is alive in an early pregnancy, saline (KCl) or 50% glucose solution or methotrexate can be injected, leading to embryonic death. Once either premise is fulfilled and in accordance with the medical group's experience, hysteroscopy can be performed with local vasopressors and a resectoscope or bipolar miniresectoscope in one or two surgical attempts, with roller ball coagulation [41–44].

With a coagulation intensity of 80 watts and a cut of 60 watts, the implantation site is located and coagulated from the periphery and advanced concentrically until it decreases completely or as far as the implantation site allows blood flow. The cutting and extraction of the gestational sac and trophoblastic tissue can be complemented with Forester's clamp or uterine clamp. Hemostasis is corroborated and supplemented with roller handle selectively. If bleeding occurs, a Foley catheter can be placed, filling the balloon with 5–7 cc of solution and removing it after 7 days.

Postsurgical monitoring should include a determination of β-hCG level every 48 hours until it is negative and a hysterosonography or hysterosalpingography 3 months after the procedure is performed.

10. Niche, cesarean scar pregnancy

This ectopic pregnancy variant is also known as "cesarean" scar, and previously, as isthmocele. The first report of this type of ectopic pregnancy appeared in 1978, and to date, its incidence is 0.15%, with a described frequency of 1 in 1800 to 2216 ectopic pregnancies [45].

It is important to emphasize that the gestational sac may become implanted in a cesarean scar, after a myomectomy, placental removal, or dilation and curettage, even after *in vitro* fertilization.

The diagnosis is difficult to establish whereby the differential diagnoses include cervical ectopic pregnancy and intrauterine pregnancy in abortion labor. Ultrasound findings include the absence of an intrauterine gestational sac, location in the endocervical canal or isthmus surrounded by cesarean scar tissue, with or without myometrium contiguous to the bladder or abdominal cavity; a Doppler image with a gestational sac within the scar defect and surrounded by high-speed vascular flow has also been described.

Niche pregnancies may be divided into two types: type I or endogenic in which the pregnancy grows toward the isthmo-cervical space or uterine cavity, and there is myometrium between it and the bladder; this pregnancy may cause transvaginal bleeding originating in the placental bed. Type II or exogenic invades the bladder or the abdominal cavity, there is no myometrium, and it is usually complicated by uterine rupture and profuse bleeding in an early pregnancy [46].

Before hysteroscopy, 4 milliliters of 50% glucose solution may be injected into the gestational sac, followed by 2.5 mg orally administered methotrexate, 3 times daily for 5 days, or the injection of methotrexate 50 mg/m^2 directly into the gestational sac. Once the embryo's death is corroborated, the niche pregnancy can be removed with a 5Fr resectoscope or a miniresectoscope and bipolar energy, or a mechanical resector (True Clear); note that only type I niche ectopic pregnancies can be treated hystero-scopically [47].

The technique of hysteroscopic surgical resection was mentioned in cervical pregnancy, remembering that if the thickness of the myometrium is less than 3 mm it is dangerous to perform the hysteroscopic technique due to the risk of perforation and bladder injury.

Type II must be treated with an abdominal approach by laparotomy or laparoscopy dissecting or even a vaginal approach. The bladder and resecting uterine and vesical tissue can be performed wit bipolar energy, scalpel, or scissors. The uterus is treated with revival and hemostasis of surgical edges and myography in 2 planes with absorbable 4/0 suture, and a Foley catheter for hemostasis control. Laparoscopy is recommended.

Niche pregnancy can be removed by resectoscopy after the administration of methotrexate, saline solution or ethanol, to provoke embryonic and trophoblastic cell death if there is intercalated myometrium [47].

11. Fertility and ectopic pregnancy

Ectopic pregnancy is a problem with consequences in women of reproductive age, and its resolution requires consideration of the patient's reproductive future. Based on this principle, laparoscopic surgery and hysteroscopy, following the previously described techniques, are part of its conservative management.

The choice of a surgical technique should consider preservation of the patient's life, preservation of the organ and its function, the possibility of persistent trophoblastic tissue or ectopic pregnancy recurrence, the possibility of requiring surgical reintervention, and/or the development of hemorrhage. An important factor to take into account in any conservative management setting is that the contralateral side (uterine and ovarian tubes) must be healthy or without apparent pathology [48].

Other points to consider to preserve the fertility rate with conservative techniques are: the decrease in trophoblastic tissue persistence (5–20%), a single 1 mg/kg intramuscular and/or local dose [49], and an increase in ectopic pregnancy recurrence resulting from the loss of uterine tube function due to scarring, inflammation, and injury caused by bipolar energy during hemostasis, all promoting the implantation of the blastocyst at the scar site [50, 51].

Despite the tendency to follow conservative management protocols, there is no significant difference after a 24–36-month follow-up with either radical treatment or removal of the involved segment, in terms of the frequency of intrauterine pregnancy (HR 1.06 (0.69–1.63; P1/4.78); the recurrence rate is 6–10% [50, 52].

Regardless of whether management is conservative or radical, we must be aware that the spontaneous fertility rate at 2 years is similar as long as there are no risk factors favoring another ectopic pregnancy; if present, radical treatment may certainly compromise spontaneous fertility.

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References

[1] Levy L, Tsaltas J. Recent advances in benign gynecological laparoscopic surgery. Faculty Reviewes. 2021;**10**:60

[2] Alkatout I, Mettler L. Hysterectomy a comprehensive surgical approach. In: Histerectomía. Germany: Springer International Publishing; 2018. p. 1676

[3] Hawe JA, Garry R. Histerectomíalaparoscópica. Surgical Innovation. 1999;**6**:80

[4] Ball E, Waters N, Cooper N, Talati C, Mallick R, Rabas S, et al. Evidence-based guideline on laparoscopy in pregnancy: Commissioned by the British Society for Gynaecological Endoscopy (BSGE) Endorsed by the Royal College of Obstetricians and Gynaecologists (RCOG). Facts Views and Vision Obstetrics and Gynaecology. 2019;**11**(1):5

[5] Committee on Practice Bulletins-Gynecology. ACOG practice bulletin 191: Tubal ectopic pregnancy. Obstetrics and Gynecology. 2018;**131**:2, e65

[6] Raznikiewicz A, Korlacki W, Grabowski A. The role of laparoscopy in paediatric and adolescent gynaecology. Miniinvasive Techniques / Wideochirurgia i Inne Techniki Malo Inwazyjne. 2020;**15**(3):424

[7] Stoval DW, Fernandez AS, Cohen SA. Laparoscopy training in United States obstetric and gynecology residency programs. JSLS. 2006;**10**(1):11

[8] Po L, Thomas J, Mills K, Zakhari A, Tulandi T, Shuman M, et al. Guideline No. 414: Management of pregnancy of unknown location and tubal and nontubal ectopic pregnancies. Journal of Obstetrics and Gynaecology Canada. 2021;**43**(5):614

[9] Song T, Lee DH, Kim HC, Seong SJ. Laparoscopic tube-preserving surgical procedures for ectopic tubal pregnancy. Obstetrics Gynecology Science. 2016;**59**(6):512

[10] Tsakiridis I, Giouleka S, Mamopoulos A, Athanasiadis A, Dagklis T. Diagnosis and management of ectopic pregnancy: A comparative review of major national guidelines. Obstetrical & Gynecological Survey. 2020;**75**(10):611

[11] Fujishita A, Masuzaki H, Khan KN, Kitajima M, Hiraki K, Ishimaru T. Laparoscopic salpingotomy for tubal pregnancy: Comparison of linear salpimgotomy with and without suturing. Human Reproduction. 2004;**19**(5):1195

[12] Fylstra DL. Ectopic pregnancy not within the (distal) fallopian tube: Etiology, diagnosis, and treatment. American Journal of Obstetrics and Gynecology. 2012;**206**(4):289

[13] Mol F, Van Mello NM, Strandell A, Strandell K, Jurkovic D, Ross J, et al. European Surgery in Ectopic Pregnancy (ESEP) study group. Salpingotomy versus salpingectomy in women with tubal pregnancy (ESEP study): An open-label, multicentre, randomised controlled trial. Lancet. 2014;**383**(9927):1483

[14] Cheng X, Tian X, Yan Z, Jia M, Deng J, Wang Y, et al. Comparison of the fertility outcome of salpingotomy and salpingectomy in women with tubal pregnancy: A systematic review and meta-analysis. PLoS One. 2016;**11**(3):e0152343

[15] Mol F, Mol BW, Ankum WM, Van der Veen F, Hajenius PJ. Current evidence

on surgery, systemic methotrexate and expectant management in the treatment of tubal ectopic pregnancy: A systematic review and meta-analysis. Human Reproduction Update. 2008;**14**(4):309

[16] Faraj R, Steel M. Management of cornual (interstitial) pregnancy. The Obstetrician and Gynaecologist. 2007;**9**:249

[17] Diagnosis and management of ectopic pregnancy: Green-top Guideline 21. BJOG. 2016;**123**(13):e15

[18] Moawad NS, Mahajan ST, Moniz MH, Taylor SE, Hurd WW. Current diagnosis and treatment of interstitial pregnancy. American Journal of Obstetrics and Gynecology. 2010;**202**(1):15

[19] Soriano D, Vicus D, Mashiach R, Sciff E, Seidman D, Goldenberg M. Laparoscopic treatment of cornual pregnancy: A series of 20 consecutive cases. Fertility and Sterility. 2008;**90**(3):839

[20] Marchand G, Taher Masoud A, Sainz K, Azadi A, Ware K, Vallejo J, et al. A systematic review and meta-analysis of laparotomy compared with laparoscopic management of interstitial pregnancy. Facts Views and Vision Obstetrics and Gynaecology. 2021;**12**(4):299

[21] Marchand G, Masoud AT, Galitsky A, Azadi A, Ware K, Vallejo J, et al. Management of interstitial pregnancy in the era of laparoscopy: A meta-analysis of 855 case studies compared with traditional techniques. Obstetrics Gynecology Science. 2021;**64**(2):156

[22] Lipscomb GH, McCord ML, Stovall TG, Huff G, Portera SG, Ling FW. Predictors of success of methotrexate treatment in women with tubal ectopic pregnancies. The New England Journal of Medicine. 1999;**341**(26):1974

[23] Cucinella G, Calagna G, Rotolo S, Granese R, Saitta S, Tonni G, et al. Interstitial pregnancy: a 'road map' of surgical treatment based on a systematic review of the literature. Gynecologic and Obstetric Investigation. 2014;**78**:141

[24] Afifi Y, Mahmud A, Fatma A. Hemostatic techniques for laparoscopic management of cornual pregnancy: Double-impact devascularization technique. Journal of Minimally Invasive Gynecology. 2016;**23**(2):274

[25] Ng S, Hamontri S, Chua I, Chern B, Siow A. Laparoscopic management of 53 cases of cornual ectopic pregnancy. Fertility and Sterility. 2009;**92**(2):448

[26] Lee MH, Im SY, Kim MK, Shin SY, Park WI. Comparison of laparoscopic cornual resection and cornuotomy for interstitial pregnancy. Journal of Minimally Invasive Gynecology. 2017;**24**(3):397

[27] Bettaiah R, Kamath SS. Intramyometrial injection of vasopressin: A novel method for hemostasis at laparoscopic management of cornual ectopic. Journal of Minimally Invasive Gynecology. 2017;**24**(7):1071

[28] Pal B, Akinfenwa O, Harrington K. Hysteroscopic management of cornual ectopic pregnancy. BJOG. 2003;**110**(9):879

[29] Minelli L, Landi S, Trivella G, Fiaccavento A, Barbieri F. Cornual pregnancy successfully treated by suction curettage and operative hysteroscopy. BJOG. 2003;**110**(12):1132

[30] Kim JS, Nam KH, Lee HH. Hysteroscopic management of cornual pregnancy. Korean Journal of Obstetrics and Gynecology. 2009;**52**(12):1313

[31] Alalade AO, Smith FJE, Kendall CE, Odejinmi F. Evidence-based management

of non-tubal ectopic pregnancies. Journal of Obstetrics and Gynaecology. 2017;**37**(8):982

[32] Atrash HK, Friede A, Hogue CJ. Abdominal pregnancy in the United States: Frequency and maternal mortality. Obstetrics and Gynecology. 1987;**69**(3 Pt 1):333

[33] Schyum AC, Rosendal BB, Andersen B. Peritoneal reimplantation of trophoblastic tissue following laparoscopic treatment of ectopic pregnancy: A case report and review of literature. Journal of Gynecology and Obstetrics Human Reproduction. 2019;**48**(3):213

[34] Ting WH, Lin HH, Hsiao SM. Factors predicting persistent ectopic pregnancy after laparoscopic salpingostomy or salpingotomy for tubal pregnancy: A retrospective cohort study. Journal of Minimally Invasive Gynecology. 2019;**26**(6):1036

[35] Ash S, Farrell SA. Hysteroscopic resection of a cervical ectopic pregnancy. Fertility and Sterility. 1996;**66**(5):842

[36] Tanos V, ElAkhras S, Kaya B. Hysteroscopic management of cervical pregnancy: Case series and review of the literatura. Jurnal of Gynecology Obstetrics Human Reproduction. 2019;**48**(4):247

[37] Matteo M, Nappi L, Rosenberg P, Greco P. Combined medical-hysteroscopic conservative treatment of a viable cervical pregnancy: A case report. Journal of Minimally Invasive Gynecology. 2006;**13**(4):345

[38] Hardy TJ. Hysteroscopic resection of a cervical ectopic pregnancy. The Journal of the American Association of Gynecologic Laparoscopists. 2002;**9**(3):370

[39] Stabile G, Mangino FP, Romano F, Zinicola G, Ricci G. Ectopic cervical pregnancy: Treatment route. Medicina (Kaunas, Lithuania). 2020;**56**(6):293

[40] Mangino FP, Romano F, Di Lorenzo G, Buonomo F, De Santo D, Scrimin F, et al. Total hysteroscopic treatment of cervical pregnancy: "The two steps technique". Journal of Minimally Invasive Gynecology. 2019;**26**(6):1011

[41] Kung FT, Lin H, Hsu TY, Chang CY, Huang HW, Huang LY, et al. Differential diagnosis of suspected cervical pregnancy and conservative treatment with the combination of laparoscopy-asisted uterine artery ligation and hysteroscopicendocervical resection. Fertility and Sterility. 2004;**81**(6):1642

[42] Maglic R, Rakic A, Nikolic B, Maglic D, Jokanovic P, Mihajlovic S. Management of cervical ectopic pregnancy with small-caliber hysteroscopy. JSLS. 2021;**25**(2):e2021.00016

[43] Di Spiezio SA, Vieira MDC, Lagana AS, Chiofalo B, Vitale SG, Scala M. Combined systemic and hysteroscopic intra-amniotic injection of methrotexate associated with hysteroscopic resection for cervical pregnancy: A cutting-edge approach for an uncommon condition. Eurasian Journal of Medicine. 2017;**49**(1):66

[44] Glenn TL, Bembry J, Findley AD, Yaklic JL, Bhagavath B, Gagneux P, et al. Cesarean scar ectopic pregnancy: Current management strategies. Obstetrical & Gynecological Survey. 2018;**73**(5):293

[45] Gonzalez N, Tulandi T. Cesarean scar pregnancy: A systematic review. Journal of Minimally Invasive Gynecology. 2017;**24**(5):731

[46] Pan Y, Liu MB. The value of hysteroscopic management of cesarean

scar pregnancy: A report of 44 cases. Taiwanese Journal of Obstetrics & Gynecology. 2017;**56**(2):139

[47] Capmas P, Bouyer J, Fernandez H. Treatment of ectopic pregnancies in 2014:new answers to some old questions. Fertility and Sterility. 2014;**101**(3):615

[48] Graczykowski JW, Mishell DR Jr. Methotrexate prophylaxis for persistent ectopic pregnacy after conservativa treatment by salpingostomy. Obstetrics and Gynecology. 1997;**89**(1):118

[49] Chen L, Zhu D, Wu Q, Yu Y. Fertility outcomes after laparoscopic salpingectomy or salpingotomy for tubal ectopic pregnancy: A retrospective cohort study of 95 patients. International Journal of Surgery. 2017;**48**:59

[50] Li J, Jiang K, Zhao F. Fertility outcome analysis after surgical management of tubal ectopic pregnancy: a retrospective cohort study. BMJ Open. 2015;**5**(9):e007339

[51] Fernandez H, Capmas P, Lucot JP, Resch B, Panel P, Bouyer J, et al. Fertility after ectopic pregnancy: The DEMETER randomized trial. Human Reproduction. 2013;**28**(5):1247

[52] Turan V. Fertility outcomes subsequent to treatment of tubal ectopic pregnancy in younger Turkish women. Journal of Pediatric and Adolescent Gynecology. 2011;**24**(5):251