The Actual Role of Surgical Therapy for Ectopic Pregnancy
Evaluation of laparoscopic and laparotomonic surgery in tubal pregnancy

Edoardo Valli¹, Antonio Capece¹, Giovanni Larciprete²*, Alessandro Bompiani²

¹Tor Vergata University Perinatal Medicine, Rome, Italy
²Obstetrics and Gynaecology Department, Fatebenefratelli Hospital, Isola Tiberina, Rome, Italy

*Corresponding Author: Giovanni Larciprete, Obstetrics and Gynaecology Department, Fatebenefratelli Hospital, Isola Tiberina, Rome, Italy.

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Abstract

Despite to the increasing resolution with medical therapy, surgical treatment is actually still needed in women who are hemodynamically unstable and in those who do not fulfil the criteria for methotrexate treatment. Surgical treatment includes salpingectomy, in which the affected Fallopian tube is removed, or salpingostomy, in which the tube is preserved. Both procedures are generally performed by laparoscopy. Laparotomy is reserved for patients with hemoperitoneum > 2000 ml, interstitial pregnancy with bleeding impossible to control by laparoscopy or unfavourable conditions for laparoscopy such as severe adhesions or contraindications for general anaesthesia. The choice between salpingectomy and salpingostomy is often made during the procedure. Radical surgery has a higher efficacy rate. The failure rate for conservative surgery, on the other hand, ranges from 6.6% to 17.5%, with the addition of a postoperative methotrexate injection, the failure rate ranges from 0 to 2%. Furthermore, recent studies showed that the reproductive outcome after salpingostomy or salpingectomy is comparable. In conclusion, salpingectomy can be the preferred surgical treatment in women with a tubal pregnancy and a healthy contralateral tube.

Keywords: Ectopic pregnancy; Laparoscopy; Salpingectomy; Salpingostomy

Ectopic pregnancy occurs in approximately 1.3%–2% of all pregnancies and it remains the leading cause of death in early pregnancy, accounting for 4% to 6% of all pregnancy-related deaths. Over 95% of ectopic pregnancies are tubal pregnancies. In most cases, an ectopic pregnancy can be treated medically with a single dose of methotrexate. Despite increasing resolution with the use of medical therapy, surgical therapy in ectopic pregnancy is actually still required. [1] At present the main indications for surgery are: hemodynamic instability, significant pain, adnexal mass >40mm, fetal heart beat, BHCG >5000, impending or ongoing rupture, contraindications to methotrexate, coexisting intrauterine pregnancy, impossibility of follow-up or reaching the hospital in cases of tubal rupture and failure of medical therapy [2,3].

Ectopic pregnancies have different locations including cervical, cervical scar pregnancies (increasing due to the percentage of cesarean sections), cornual, interstitial and abdominal pregnancies. In this review surgical indications and options for tubal pregnancy are reviewed. The surgical treatment of ectopic pregnancy has changed in recent years from an often urgent laparotomy to a more conservative laparoscopy [3]. Laparoscopy can be performed in almost 95% of cases that require surgery.

A study conducted in Iceland [4] showed the proportion of laparoscopic procedures increased from 80.5% to 91.1% in the years 2000-2009. In university hospitals this increase was from 91.3% to 98.1%, while in rural hospitals the increase was from 44.0% to 69.3%.

The Actual Role of Surgical Therapy for Ectopic Pregnancy

The hemoperitoneum in ruptured ectopic pregnancy can easily reach 1500 ml but bleeding is generally slow and gradual and the treatment can be performed by laparoscopy if the surgeon is able to enter the peritoneal cavity and secure hemostasis as quickly as during laparotomy [3].

In a recent study of Cohen (2013), the mean operating time was significantly shorter in the laparoscopy group (50 vs 60 minutes), and intra-abdominal blood loss resulted greater in the laparotomy group (1500 mL vs 1000 mL). A key factor for short operating time was the direct trocar insertion which being safe in expert hands significantly shortens the time required to create a pneumoperitoneum and control the hemorrhage. The authors conclude that while the mode of surgery should be based on the surgeon’s experience and preference, the significantly lower hemoperitoneum during laparoscopy may be a reflection of shorter operating times and quicker hemorrhage control and the effect of pneumoperitoneum with blood vessel tamponade [5].

Many other studies demonstrate that in hemodynamically stable patients, laparoscopy offers many advantages over laparotomy, regarding costs, hospitalization, surgery time, blood loss, analgesics and recovery time [3, 6, 7]. Laparotomy remains an option for patients with previous multiple laparotomies and severe pelvic adhesions, for complicated procedures it is dependent upon the surgeon’s laparoscopic experience.

Definitely, the actual contraindications for laparoscopic surgery in ectopic pregnancy are: Shock with hemoperitoneum > 2000 ml (Figure 1), interstitial pregnancy with bleeding impossible to control by laparoscopy or unfavourable conditions for laparoscopy such as severe adhesions or contraindications for general anaesthesia [3].

Laparoscopic access should utilize two 5 mm suprapubic trocars, one for suction-aspiration and the second for a traction grasp. The instrument positions respect to the GEU localization is in relation to the operator position. The use of an intrauterine manipulator is useful because it allows a quicker identification of the bleeding site by mobilizing the uterus away from the blood that is nearly always present in the Douglas pouch. To evaluate the following surgical options the aspiration of hemoperitoneum allowing the exposure of the ectopic pregnancy is mandatory. At this time, the evaluation of contra-lateral adnexa is important to confirm the surgical options.

Conservative therapy can be performed except for recurrent ectopic pregnancy, severe tubal damage, or hemodynamic instability, when salpingectomy is the mandatory surgical option. There are many literature reports that evaluate results of conservative treatments in terms of persistence of trophoblastic tissue, future fertility and recurrence of ectopic pregnancy, with different results [7-10]. A study from the Clermont Ferrand group showed that when salpingostomy was performed in the case of spontaneous tubal rupture the percentages of intrauterine pregnancy and GEU recurrence were 63.6% and 14.5% respectively, while in non-ruptured salpinx percentages were 66% and 18.1%. When the evaluation was between salpingectomy and salpingostomy, the term pregnancy and Geu recurrences resulted similar [11].

The Actual Role of Surgical Therapy for Ectopic Pregnancy

Hajenius, et al [12] showed that the reproductive outcome after salpingostomy or salpingectomy is comparable. Salpingostomy was associated with a 4% to 15% risk of persistent ectopic pregnancy and a 15% incidence of recurrent ectopic pregnancy. The size of the ectopic pregnancy that exceed 3.5mm and fimbrial and isthmic ectopic pregnancies were significantly associated with the higher failure rate.

The DEMETER trial is the first prospective study comparing conservative and radical surgery in term of future fertility. This study showed no difference in subsequent 2-year fertility: 70% versus 64% for intrauterine pregnancy, respectively, hazard ratio 1.06 (0.69–1.63; P=.78). The rate of recurrence for ectopic pregnancies ranged from 6% to 10%, regardless of the treatment option [13].

Van mello, et al for the European Surgery in Ectopic Pregnancy study group (ESEP) (2014) in a randomized multi-centric trial concluded that salpingectomy should be the preferred surgical treatment in women with a tubal pregnancy and a healthy contralateral tube, because results of conservative treatment doesn’t increase future fertility [14].

Technique

Conservative treatment of tubal pregnancy includes: longitudinal salpingostomy, ampullary squeezing or milking, trans-ampullary aspiration, and partial salpingectomy with reanastomosis.

Salpingostomy

The first option is the injection of a vasoconstrictor substance in the mesosalpinx before than salpingotomy, to increase hemostasis reducing the subsequent need of coagulation. Many surgeons perform bipolar coagulation on the antimesenteric tubal surface before than perform incision (Figure 2). The incision can be performed with a monopolar needle or a cold scissor, in the antimesenteric side of the salpinx, possibly in the proximal third of hematosalpinx (Figure 3). This is often sufficient to obtain the spontaneous exit of blood clots and trophoblastic tissue from the salpinx.

Figure 2: Four steps for salpingotomy. A, coagulation of the tubal surface. B, the white line represents the way to cut in. C, cut the surface opposite to the meso. D, aspiration.
The extraction can be completed by aspirating the residual trophoblastic tissue from the tubal incision. This can be performed preferably by using washing aspiration cannula (Figure 2D). The use of grasping forceps can easily damage the tubal mucosa and need to be avoided or used with extreme care only if some trophoblastic tissue remains strongly adherent to the tubal mucosa. It is mandatory to explore the tubal lumen to evaluate the presence of residual trophoblastic tissue. The control of bleeding in the trophoblastic implant zone and tubal incision can be accomplished by bipolar forceps with low power to minimize the thermal damage to the normal tubal tissue. The extraction of trophoblastic tissue from the abdominal cavity can be performed by aspiration cannula, graspers, but an endoscopic bag is the best option to minimize the risk of incomplete removal and heterotopic implantation.

Before completing the procedure it is important to perform an accurate washing and toilet of the abdominal cavity (Figure 4), also moving the patient into the anti-Trendelenburg position that help to remove blood from the upper abdomen. An intra-abdominal drain-age can be repositioned if the blood cannot be completely removed, especially when pelvic or abdominal adhesions are present.

Other conservative treatments include the aspiration of trophoblastic tissue from the tube without incision, the squeezing or milking of the tube with atraumatic graspers to help the expulsion from fimbriae. The latter is only possible in selected cases, when the localization is ampullar and easily detachable from the tubal mucosa and in an expert surgeon’s hands to avoid tubal damage. In the case of tubal abortion, this can be evacuated by using laparoscopic suction cannula or laparoscopic forceps followed with endobag.
there is suspicion that trophoblastic tissue is residual in the Fallopian tube or in the abdominal cavity, and it is not possible to remove it completely, the administration of 1 dose of Metotrexate in the immediate postoperative period is suggested.

The follow-up of conservative treatment requires βHCG evaluation 7 days after surgery: levels less than 5% of the preoperative value indicates complete resolution. The post surgical clinical monitoring becomes mandatory in the case of conservative surgery, but it is also useful in cases of salpingectomy. βHCG the day following surgery less than 50% of presurgical value indicates adequate and definitive treatment while βHCG in the second postoperative day > 35% of preoperative value indicates inadequate treatment and intermediate values require evaluation till βHCG negativization [15]

Salpingectomy

Salpingectomy is often performed with bipolar forceps due to the simplicity and economy of use (Figure 5). Ultra-sound (Ultrasion), ligasure and other more technological instruments can be used depending on the availability and budget of the structure. Salpingectomy can be performed either from the uterine horn to the fimbrial portion (anterograde, Figure 6) or from the fimbrial portion to the uterine horn (retrograde, Figure 7).

**Figure 5**: Tubal excision sequence. Deep coagulation of the mesosalpinx and removal using the endobag

**Figure 6**: Anterograde cutting salpingectomy.
If a tubo-ovarian adhesion, fimbrial or originated by clots is present this first needs to be removed and the ovary visualized and mobilized (Figure 8). The tube is then tractioned and the tubal artery coagulated after the bifurcation from the ovarian artery. The coagulation and dissection of the mesosalpinx is conducted with bipolar forceps and cold scissors near the tube to minimize the vascular damage to the ovary until the excision is completed. The tube is finally extracted using an endoscopic bag to minimize diffusion of trophoblastic tissue (Clip 1).
In women with an interstitial or cornual pregnancy (Figure 9) who require surgery, laparoscopic cornual resection (Figure 10) or cornuostomy (salpingostomy) can be performed. The myometrium should be sutured similarly to the closure of a myometrial incision. Hysteroscopic removal of cornual pregnancy has also been described, but its efficacy is unclear and will be reviewed in another chapter [3].

**Figure 10:** Cornual pregnancy resection.

**Clip 1.** Short cutted video with the whole procedure of salpingectomy by laparoscopy

### Bibliography

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