

not use reabsorbable membranes to prevent adhesions but we perform an accurate hemostasis. After surgery, 12 patients received Danazol while 9 had postsurgical treatment with GnRh analogues for 3 months. Thirty-nine women received estroprogestinic pills. Infertile patients did not undergo any therapy for 6 months after surgery. Transvaginal ultrasound scan was programmed. The cumulative pregnancy rate and the percentage of recurrences were calculated using the Kaplan Meier method and the groups were compared with the median of the Log rank test. The Chi square test, Fisher exact test and T test were chosen for nonhomogenous data.

**Fertility:** by considering only infertile patients prior to the laparoscopic approach, 25 out of 57 patients became pregnant (49.9% pregnancy rate). The cumulative pregnancy rate at 24 months was 57.7%. Most of the patients became pregnant during the first 6 months after surgery. The patients characteristics in relation to pregnancy status are illustrated in table 2. Twenty-three patients with stage III endometriosis (23/45, 51%) while only two stage IV patients became pregnant (2 / 12, 16.7%)  $p < 0.05$ . We found a statistically significant difference between patients who did and did not conceive in relation to the adhesion score ( $p < 0.005$ ).

Tab. 2 – Clinical characteristics of infertile patients.

	Pregnancy	No pregnancy	Total
No. of patients	25 (43.9%)	32 (56.1%)	57
Age (mean $\pm$ SD)	30.1 $\pm$ 3.5	33 $\pm$ 3.8	31.7 $\pm$ 3.9
Duration of infertility	27.6 $\pm$ 17.2	40.7 $\pm$ 34.7	34.8 $\pm$ 28.7
Stage			
III	23 (51%)	22 (49%)	45
IV	2 (16.7%)	10 (82.3%)*	12
Score adhesions	5.3 $\pm$ 5.9	12.4 $\pm$ 17.3†	9.8 $\pm$ 14.4
Score implants	22 $\pm$ 8.1	24.6 $\pm$ 9.9	24.8 $\pm$ 13.5

**Recurrences.** There were five (3.5%) recurrences at 6 month follow-up. The cumulative recurrence rate at 24 month follow-up was 27%. The cumulative curve of pain relapses in all the patients and in relation to endometriosis stage was statistically significant ( $p < 0.05$ ). Therefore, recurrences do not seem to be related to the anatomic patterns and diameter of the cysts, nor to the medical therapy or surgical techniques.

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## Laparoscopic surgical approach to ectopic pregnancy

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The incidence of ectopic pregnancy (EP) ranges between 1-2%. EP represents the most frequent cause of maternal gestational death under 20 weeks of pregnancy. Mortality for EP is 10-fold higher with respect to intrapartum mortality which justifies its fame of "being a disaster in human reproduction" [1]. Ectopic pregnancy is often associated with hypofertility or reproductive failures such as recurrent abortion. The rising incidence (about 10% every year) of EP reported in the literature is multifactorial due to an increase in

the risk factors-asymptomatic pelvic inflammatory disease, previous tubal surgical procedures, new modern assisted reproductive methods- but also to better, earlier diagnosis using high sensitivity, refined techniques as  $\beta$ HCG radioimmunoassay and transvaginal ultrasound [2, 3, 4]. Nowadays, a correct early diagnosis of EP is possible in more than 90% of cases before six gestational weeks. Therefore EP, a pathology that commonly was treated as a life threatening emergency in the past, now often is detected in very early phases enabling the surgeon to perform conservative treatment and favouring the use of less invasive management such as laparoscopic techniques or even medical therapy in selected cases [5, 6, 7]. Laparoscopic treatment of EP was first described in 1973 by Shapiro and subsequently diffused by Semm and Bruhat. Many Authors reported large case-series on laparoscopic management of EP, promoting the advantages of this surgical approach [8, 9, 10, 11]. Controlled prospective trials comparatively analyzed rates, tubal patency, postoperative morbidity, length of hospital stay and costs after laparoscopic surgery (LPS) versus laparotomy (LPT) [12, 13] and revealed that the two surgical procedures were similarly safe and effective but LPS was less expensive and required a shorter and uneventful recovery. Controlled prospective trials analyzed adhesion formation after laparoscopic surgery versus laparotomy. Tubal integrity and extent of pelvic adhesions were assessed at second look laparoscopy within 15 weeks of initial surgery. Although tubal patency did not differ between the 2 groups, patients who were treated by laparotomy developed significantly more adhesions than those treated by laparoscopy [14]. Fertility outcome did not differ significantly after LPS with respect to LPT as seen in table 1. As stressed by many authors pregnancy rates were not related to the type of surgery (conservative or radical) but to the conditions of the contralateral tube and to the previous fertility history of the patient [15, 16, 17]. Nonetheless, Tuomivaara revealed an improved pregnancy rate after salpingotomy versus salpingectomy in cases of pathologic contralateral tube (73% vs 43% IUP), data which overlap those obtained by Guerlen and Pouly [18, 19].

Tab. 1 – Fertility after LPS conservative treatment of EP

Authors	Years	Type of treatment	N.	IUP		EP	
				n.	%	n.	%
De Cherney	1987	C	69	36	52	7	16
Donnez	1990	C	138	70	51	14	10
Pouly	1991	C	223	149	67	27	12
Candiani <i>et al.</i>	1996	C	55		53.8		7.8
Reich	1988	C+R	38	19	50	11	29
Mecke	1989	C+R	74	42	57	10	14
Candiani <i>et al.</i>	1996	R	59		62.5		5.1
Dubuisson	1990	R	125	30	24	16	13

C = conservative; R = radical;

LPS = laparoscopy; EP = ectopic pregnancy;

IUP = intrauterine pregnancy.

(J. L. Pouly, modified)

## Material and Technique

### a) Conservative treatment (fimbrial expression, linear salpingotomy, segmental salpingectomy).

The indications for conservative treatment are addressed to patients with unruptured EP wishing to preserve their reproductive potential, with a history of infertility and a pathologic contralateral adnexa. Contraindications for conservative treatment are EP with a diameter which exceeds 5 cm, with FHA (fetal heart activity) and high  $\beta$ HCG levels (>20.000 mUI/ml), previous surgery on the affected tube and unavailability for adequate follow-up [20]. Tubal “milking out” (fimbrial expression) might be used in small ampullary unruptured pregnancies but presents a high incidence of persistence.

**Technique:** conservative LPS treatment of EP was first performed by Bruhat and Manhes. The creation of new refined instrumentation and the use of vasoconstriction agents to reduce intraoperative bleeding improved technical possibilities. Initial washing to obtain a good view of the operatory field, is followed by injection into the mesosalpinx of diluted adrenalin solution, and antemesenteric incision on the buldge of the dilated tube is performed by a monopolar needle tipped electrode or by a plurifunctional instrument (TRITON) able to perform cutting, coagulation, washing and aspiration. Then, the EP should be left to “deliver by itself”. If the trophoblast is highly adherent to the tubal walls, hydrodissection may be useful, but in these cases deep trophoblastic invasion may be responsible for a high risk of recurrence and the possibility of a demolitive procedure must be considered. Haemostasis must be accurate and the linear incision does not need to be sutured. Trophoblastic material extraction is done by using an endobag, in order to avoid contamination and peritoneal reimplantation. Sometimes, resection of a tubal segment containing the EP is preferable. Segmental resection is appropriate for patients desiring future fertility who have a compromised opposite tube and are not candidates for linear salpingotomy. Conservation of a minimum of 3 cm portion of the tube, with a segment including the ampullary isthmus junction is an important prerequisite for subsequent tubal reconstruction. This procedure is appropriate only when future anastomosis is intended. Postoperatively, Beta hCG titers are monitored weekly until negative. Rates of persistent trophoblastic tissue requiring treatment range between 4.8-20% but are currently approximately 7% and might be successfully managed by systemic Methotrexate. Postsalpingotomy recurrence rates are directly proportional with high Beta in hCG levels (> 10.000 UI/ml), large size of the EP and last but not least with lack of surgical experience. Pregnancy rates after salpingotomy are slightly higher than after salpingectomy [18, 19]. However, in the case series of Clermont Ferrand the incidence of a subsequent EP after systemic salpingotomy was twofold higher than after systemic salpingectomy. Pouly *et al.* confirmed that hematosalpinx dimensions, amount of hemoperitoneum and tubal rupture do not statistically influence postoperative fertility, while a positive history of recurrent salpingitis, previous EP, tubal surgery and contralateral tubal adhesions slightly worsen it. Considering these parameters the Authors suggest the use of a score to select patients for conservative or demolitive procedures, choosing the most appropriate treatment, which may assure on one hand a possible conservation of fertility and on the other hand minimizes the risks of subsequent EP (Pouly score - table 2).

Tab. 2 – Therapeutic score of EP

Factors which influence fertility after EP	(Pouly, 1997) Coefficient
History of EP	2
Every EP	1
History of LPS adhesiolysis	1
History of tubal surgery	2
Unique tube	2
History of PID	1
Homolateral Adhesions	1
Controlateral Adhesions	1

*b) Radical demolitive treatment (salpingectomy)*

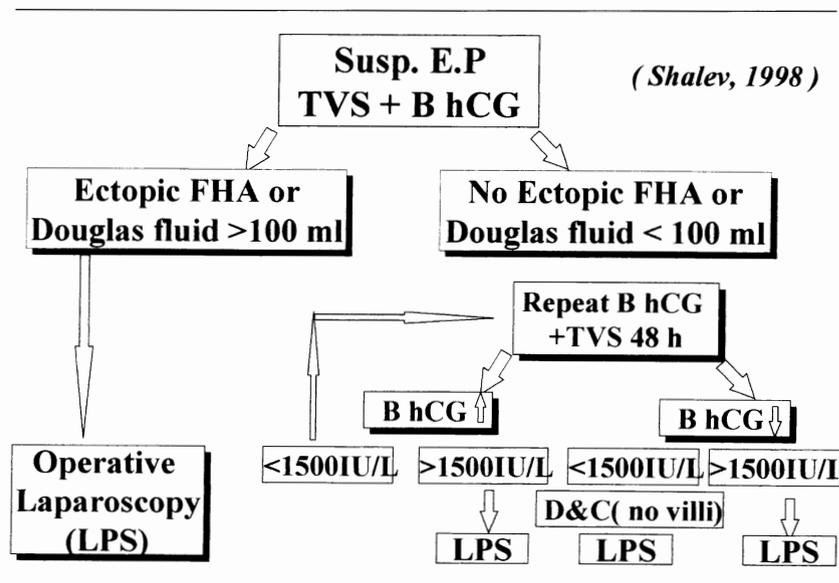
Salpingectomy is the procedure of choice in all cases when the tube is unsalvageable, ruptured, when hemostasis is difficult to achieve or in ishmie EP when extensive luminal distruction reduces the effectiveness of salpingotomy.

The simplest technique to be used is by bipolar coagulation. Using a pure cutting current of 30-50 watts, the tube is desiccated and cut by retrograde section (beginning with the tubo-uterine junction and continuing with the mesosalpinx) or by anterograde section (beginning with the fimbriated end of the tube). Tubal incision near the uterine junction must respect a “security distance” as hemostasis may be difficult at this level. An alternative technique is to utilize pretied ligature (Roeder loop) to ligate the masosalpingeal pedicle once the proximal portion of the tube is isolated from the uterus and this may be useful when severe adhesions are present. Copious lavage and inspection of peritoneal surfaces should be undertaken to detect any trophoblastic fragment. Some Authors stress the importance of the evaluation of the contralateral tube preferably by salpingoscopy, to determine future fertile potential and eventually address the patient to assisted reproductive programmes. After salpingectomy, Beta hCG level drop is more rapid and recurrences less frequent. Pregnancy rates postsalpingectomy overlap those postsalpingotomy and depend on the condition of the contralateral tube.

**Results**

Our initial experience with laparoscopic management of ectopic pregnancy includes 20 consecutive cases treated by laparoscopy between July 1996 and May 1998. The mean age of the patients was 32 years (range 29-35). Nine women were treated by total salpingectomy, one by segmental salpingectomy and the remaining 10 by linear salpingotomy. Indications for demolitive surgery included patients who did not want to preserve fertility and/or a therapeutic score > 6. No intra or postoperative complications occurred. One laparotomic conversion for copious hemoperitoneum (1300 cc) in a hemodynamically unstable patient was required. Nineteen out of 20 patients were discharged the day after surgery in optimal condition. No persistence or recurrence occurred. A previous study carried out on our first laparoscopically treated cases with respect to laparotomy emphasized a significantly shorter recovery (1.2 days vs 4.3) in the laparoscopy group. Moreover, patients treated laparoscopically were analgesic-free after surgery [22]. Our optimistic initial experience encourages us to use laparoscopy in the management of EP in selected patients, according to the flow-chart suggested by Shalev (1998) (Table 3) – and using the following criteria for management options (Table 4) [23].

Tab. 3



Susp. EP = Suspect ectopic pregnancy; TVS = Transvaginal sonography;  
 FHA = Fetal heart activity; LPS = Laparoscopy.

Tab. 4 – Ectopic pregnancy. Surgical treatment. Criteria for management options.

• Clinical conditions
• Beta hCG absolute values
• Beta hCG serial values
• Ultrasonography (size of the gestational sac, FHA amount of the hemoperitoneum)
• Possibility of a monitoring period
• Wishing of further pregnancy
• Patient's consensus

(G. T. Fossum, 1986)

## Conclusions

Ectopic pregnancy is an increasing health problem. Because of delayed childbearing and diffused use of assisted reproductive techniques, its frequency is constantly rising. Serial Beta hCG levels and transvaginal ultrasound as well as progesterone dosage may be useful methods for early detection of and ectopic pregnancy. Early diagnosis permits more conservative therapies, including expectancy and systemic Methotrexate. Laparoscopic conservative or demolitive treatment is the “gold standard” in the majority of the cases, but a wider use of laparoscopy could be obtained only by improving the training of surgeons in this field. The major limitations to this approach are operator-dependent. Special consideration should be addressed to the choice of the procedure and technique in order to offer the best results in terms of future reproductive potential and prevention of recurrences.

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