CASE REPORT

Laparoscopic fimbrioplasty: an evaluation of 35 cases

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The aim of this prospective study was to assess the value of laparoscopic treatment of severe fimbrial occlusions. During a period of 52 months infertile patients with fimbrial lesions were treated by operative laparoscopy. Only those patients requiring incision of the tubal serosa (salpingostomy) were included, representing the most severe lesions. The most frequent cases, those patients requiring simple adhesiolysis and deagglutination of the fringes, were excluded. All tubal lesions were documented carefully. Positive Chlamydia trachomatis (CT) serology was found in 65.7% of the patients. All the patients were followed up for at least 2 years. Three patients lost to follow-up were defined as failures. The global conception rate was 74.3%. The intrauterine pregnancy rate was 51.4%, and the ‘take home baby rate’ was 37.1% (only the first pregnancy being taken into account). The ectopic pregnancy rate was 22.9%. A positive CT serology was found to have a significant influence on the outcome. It can be concluded that the laparoscopic approach provides results similar to those obtained by microsurgery for the treatment of severe fimbrial occlusions, and represents an acceptable alternative to in-vitro fertilization (IVF) in selected cases.

Key words: Chlamydia trachomatis/fimbrioplasty/infertility/operative laparoscopy

Materials and methods

Study population

From July 1988 to November 1992, 35 cases were found to fulfil the criteria for selection (a fimbria covered partially or totally by tubal serosa); these were recorded prospectively. The age of the patients ranged from 22 to 37 years (mean, 30.5 years). The duration of infertility ranged from 1 to 8 years, with a mean duration of 3.5 years. A total of 15 patients suffered from primary infertility and 20 from secondary infertility; among the latter, eight had undergone a voluntary abortion, two a spontaneous abortion, two an ectopic pregnancy, while eight had at least one living child.

All patients underwent a routine infertility work-up, including a hysterosalpingography, an assessment of the ovarian function, and a post-coital test; seven patients were either dysovulatory or anovulatory. Sperm analysis performed on the husbands showed that three had varying degrees of sperm abnormality. Chlamydia trachomatis serology (CTS) was also assessed in all patients (using an enzyme-linked immunosorbent assay); CTS was defined as positive for titres of 1/64 or more.

Other relevant past-history findings included three patients treated for endometriosis, four with one or more episodes of salpingitis differentiated from a true hydrosalpinx); (iv) prefimbrial phimosis (Gomel, 1983).

For each type of lesion, a specific procedure, frequently a ‘fimbrioplasty’, is performed; however, these can be classified as: (i) adhesiolysis for fimbrial adhesions only; (ii) deagglutination of the fringes; (iii) salpingostomy when a serosal incision is required. These three procedures differ in their ability to restore a functional infundibulum and subsequently in their ability to offer a reasonable chance of conception.

Over the last 20 years, these lesions were treated by microsurgery (Audebert et al., 1980; Paton, 1982). Despite the fact that the laparoscopic approach was described as early as 1977 (Gomel, 1977), very few published series have properly assessed their treatment by laparoscopy (Gomel, 1977; Dlugi et al., 1994). One of the problems has been the lack of a strict terminology, and, hence previously reported fimbrioplasties have usually included the various lesions described above.

In order to evaluate the value of laparoscopy, we assessed the results obtained with more severe lesions (type c lesions), which required sections of the tubal serosa. In our experience, these ‘severe’ fimbrial lesions are rare; during the period of this study, we performed many more adhesiolysis and deagglutination techniques, which are not included, as well as six times as many salpingomeostomies, which were used for the treatment of hydrosalpinges.

Introduction

The abnormalities of the tubal infundibulum can arise from a wide spectrum of lesions which vary in their severity and their inability to compromise tubal function. However, in the majority of cases, the impairment of fertility is not absolute.

Lesions can be categorized as follows: (i) perifimbrial adhesions, with or without associated intra-infundibular adhesions; (ii) partial or complete agglutination of the fringes (phimosis); (iii) serosal covering of the fringes leaving only a small tubal opening, in which, in the rare instances, the covering is total, leads to a complete occlusion (hard to
diagnosed by laparoscopy, five were surgically treated for an ovarian cyst, two with complicated appendicitis and three with problems associated with the use of an intrauterine contraceptive device. Thus, 10 of the 35 patients had undergone a previous laparotomy and in 12 patients, the past-history findings were considered to be relevant to the current tubal pathology. Prior to laparoscopic treatment, a careful assessment of the tubes and the pelvis was conducted, using a scoring system for each abnormality. At the time of the study, a tuboscopy was carried out in certain patients, and the findings of this exploration did not cause the therapeutic decision to be modified.

Procedure
All patients were operated on by the same surgeon (A.J.M.A.). An adhesiolysis was performed first, when necessary. Tubal patency was then assessed by hydrotubation through a canula introduced into the uterine cavity. The type of lesion was assessed and the case was included in the study if the selection criteria were fulfilled. The best tube was used for the final classification.

Fine endoscopic instruments (atraumatic forceps, bipolar coagulation forceps, scissors and needle holders) were used; a physiological solution was used for copious irrigation and lavage during and after the procedures. Endoscopic visualization permitted significant magnification when necessary.

After sectioning the serosa and enlarging the tubal ostium, three different techniques were applied for maintaining the eversion of the restored fimbrial fringes: (i) vaporization of the serosa with a CO₂ laser ($n = 14$); (ii) bipolar coagulation of the serosa ($n = 14$); and (iii) fine endopelvic stitches with prolene no. 7 ($n = 7$). When necessary, all associated lesions were treated accordingly.

No specific perioperative adjuvant medical treatment was prescribed routinely, except in three cases where an active inflammatory process was present. This was treated using normal procedures. All patients had a minimum follow-up of 2 years during which time they actively tried to conceive. All patients lost for follow-up ($n = 3$) were defined as failures in the final analysis, as in previous microsurgical reports. Only the first pregnancy was taken into account in the analysis of results. Life table analysis was applied according to the methodology of Kaplan–Meier (Figure 1).

Results
CTS was positive in 65.7% of the patients according to our criteria. At the time of the laparoscopic assessment preceding the operative step, three patients were found to have an active macroscopic inflammatory process affecting both Fallopian tubes, despite normal clinical findings.

Four patients had peritoneal or ovarian endometriosis and one had a subserosal uterine leiomyoma measuring 6 cm in diameter. Of the patients, 25 (71%) had varying degrees of associated adnexal or pelvic adhesions. In 13 cases, either only one Fallopian tube was present or the second tube had a complete proximal complete obstruction. In a further 12 cases, a hydrosalpinx, requiring a salpingoneostomy, was present on the second Fallopian tube.

Conception occurred in 26 patients (74.3%) with 18 (51.4%) intrauterine pregnancies; five patients had a spontaneous abortion (14.3%), and 13 patients delivered at least one living child (37.1%). Eight ectopic pregnancies were reported (22.9% of patients operated upon) (Table I); 53.8% of the conceptions occurred within 12 months and 73.1% within the first 2 years of follow-up. The time to conception ranged from 2 to 57 months.

No significant difference in conception rates was observed between patients suffering from primary or secondary infertility (73.3 and 75% respectively). The proportion of patients with a positive CTS differed significantly between the groups ($P < 0.05$), when classified according to the outcome of surgery: (i) 44.4% in patients with an intrauterine pregnancy; (ii) 88.8% in patients with an ectopic pregnancy; (iii) 88.8% in failed cases.

Due to the small number of cases, the number of variables affecting the results and the lack of randomization of the three techniques used for fringe eversion, it was difficult to conclude whether one technique was superior to the others; the conception rates were 69.2, 86.6 and 57.1% respectively for eversion techniques using CO₂ laser, bipolar coagulation and the fine sutures.

Among the nine failures, three patients were lost to follow-up, one patient was subsequently operated on for a thyroid cancer and abandoned further desire for pregnancy, two patients were found to have an active inflammatory process at the time of surgery, and two patients had an associated cause for infertility. Two patients had undergone a previous tuboplasty, and in both cases the second procedure was a failure. No significant intra- or post-operative complications were recorded in this short series.
Table II. Previously reported pregnancy rates following fimbrioplasty

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<tr>
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<th>Number of cases</th>
<th>Percentage of intrauterine pregnancies</th>
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<tr>
<td><strong>Microsurgery</strong></td>
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<tr>
<td>Audebert et al., 1980</td>
<td>43</td>
<td>34.9</td>
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<tr>
<td>Patton, 1982</td>
<td>40</td>
<td>53</td>
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<tr>
<td>Brémond, 1982</td>
<td>144</td>
<td>36.8</td>
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<td><strong>Operative laparoscopy</strong></td>
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<td>Gomel, 1977</td>
<td>9</td>
<td>44</td>
</tr>
<tr>
<td>Dlugi et al., 1974</td>
<td>41</td>
<td>20.4</td>
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<td>Donnez and Nisolle, 1994</td>
<td>380</td>
<td>60</td>
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<td>Present study</td>
<td>35</td>
<td>51.4</td>
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**Discussion**

Infundibular abnormalities include a wide spectrum of lesions with different prognoses in terms of fertility. Thus, a strict definition is mandatory to be able to compare the results of different study series; in order to exclude those cases where only adhesiolyis or deagglutination were performed. In this study, we excluded those cases and only included those cases which necessitated incision and excision of the tubal serosa. These usually represent the most severe forms of infundibular occlusion; and hence, to the ‘true’ fimbrioplasty.

However, these cases are infrequent, so that our series was limited to 35 patients; moreover, they are not all ‘pure’ cases, since in 12 patients a hydrosalpinx was present on the contralateral Fallopian tube, which reduced the power of the study.

On some occasions it is difficult, prior to restoration, to differentiate between a complete infundibular occlusion (with a fimbria present) and a true hydrosalpinx: surgical procedure on the former will be classified as a fimbrioplasty and on the latter as a salpingoneostomy. In many published series it is difficult to know which types of lesions are included, making comparison difficult.

The results obtained in this study are comparable with those achieved in other series, where the patients were operated upon either by microsurgery or by operative laparoscopy (Table II). Despite the use of fine instruments and the capacity for magnification, laparoscopy cannot achieve the meticulousness offered by microsurgery; the term ‘laparoscopic microsurgery’, which is sometimes used, appears to us to be inappropriate. However, the results of the two methodologies seem very similar for the same lesions, despite the lack of a true comparative study. However, it is difficult to realize a randomized study to compare operative laparoscopy and microsurgery requiring laparotomy; the well-publicized advantages of laparoscopy will reduce the number of patients willing to enter such a study.

A high proportion of patients with a positive CTS was observed in this series (65.7%); despite the limited value of this isolated serology, failures and ectopic pregnancies were found to be associated with high rates of positivity (88.8 and 85.7% respectively). Infundibular lesions due to CT are probably associated with alterations affecting the whole Fallopian tube, and may explain why our rate of ectopic pregnancies was so high; this is in accordance with the migration of this agent. This fact supports the more extensive use of a complete investigation of the Fallopian tube lumen, by Fallopscopy or ampulloscopy, before selecting those cases suitable for surgery.

In a recent study of 40 fimbrioplasties, the duration of infertility did not influence the outcome of surgery (Dlugi et al., 1994). On the contrary, other associated lesions and infertility factors, such as endometriosis or male factor, appeared to reduce the likelihood of success (Dlugi et al., 1994). The impact of associated adhesions is notable only in the case of moderate or severe adhesions; the same finding was established in a series of 87 salpingoneostomies (Canis et al., 1991).

Due to the small number of cases, it is also difficult to analyse the influence of the number of tubes present or the presence of a hydrosalpinx on the contralateral Fallopian tube. For the same reason, it is not possible to compare efficiently the different techniques which have been used. In a series of 230 salpingoneostomies performed for hydrosalpinges, the techniques which used either the CO2 laser or fine sutures appeared to provide better outcomes (Audebert, 1995). On the contrary, this series of fimbrioplasties suggests that the bipolar coagulation technique may be superior. Due to many confounding factors it is inappropriate, with such a non-randomized series, to make any valid comparison.

In-vitro fertilization (IVF) is an alternative treatment, which should be discussed with the patients before selecting them for surgery. No comparative study has been performed for this type of lesion. It is also difficult to select which outcome parameter of IVF provides an appropriate comparison. On an arbitrary basis, we have chosen the calculated cumulated results of three IVF attempts, since this can be achieved within 12 months, the period of time during which 53.8% of conceptions occur after fimbrioplasty.

For comparison, we have selected the results of the French IVF registry (FIVNAT) for tubal diseases during the same period (1988–1992) (FIVNAT, 1994). Based upon these criteria the results appear to differ with a theoretical delivery rate of 32.8% following three IVF attempts and 17.1% following fimbrioplasty (representing the six deliveries in this series). However, this does not represent a true rate of comparison, because both the characteristics and the tubal lesions of the IVF patients were so varied; furthermore, not all patients were able to undergo three IVF attempts within 1 year. The comparison of risks (including all issues such as multiple pregnancies etc.), the time required, and the cost should be assessed. We have not addressed these issues in this study.

The decision on which is the most appropriate modality of treatment depends upon other factors, such as the age of the patients, the presence of other associated factors for infertility and indeed the desire of the couples themselves. The same considerations apply in the case of hydrosalpinges (Filippini et al., 1996). The appropriate selection of patients is thus the main factor affecting outcome, as has been demonstrated previously for microsurgery.

Nowadays, ampulloscopy is an additional technique which may be used, not only to predict the chances of conceptions but also to reduce the risk of ectopic pregnancy. The number
of ectopic pregnancies was rather high in this series, probably
due to the high number of patients with positive CTS. In a
recent study of 158 patients with various causes of infertility,
the severity of the tubal lesions, as visualized at ampulloscopy
with a rigid system, significantly influenced the rate of concep-
tions (Helen et al., 1995). According to the scoring system
used, the cumulative rates of conception were 71% for stages
I and II (less severe cases), 31% for stage III and 0% for stage
IV (Helen et al., 1995).

Although the present study is very limited, mainly because
of very strict definition of the lesions included limited the
number of cases, other published results have also been very
limited and often not clear regarding the type of lesions under
investigation.

However, we can conclude that operative laparoscopy is an
acceptable treatment for severe infundibular alterations. Among
factors affecting the results, the CTS titre appears to be one
of the most relevant. In younger women with no other major
associated factors for infertility, laparoscopic fimbrioplasty
should be considered as the first line of treatment, providing
that the associated risk of ectopic pregnancy is acceptable. A
decision may be based upon past history and CTS results. The
ability of ampulloscopy to provide better patient selection,
should be further evaluated in case of fimbrial alterations.

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Received on February 11, 1997; accepted on March 24, 1998