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Microsurgical salpingostomy is not an obsolete procedure

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Abstract

Objective—A review of the results of microsurgery for bilateral distal tubal blockage.
Design—A retrospective review.
Setting—Hammersmith Hospital London and local private hospitals.
Subjects—388 patients with bilateral ampullary occlusion treated between 1971 and 1988 by microsurgery.
Interventions—Full investigation for other causes of infertility followed by abdominal microsurgical salpingostomy. Repeated meticulous follow-up was essential with check laparoscopy one year after surgery.
Main outcome measure—Successful pregnancy in relation to tubal damage.
Results—In 65 women microsurgery followed tubal reocclusion after failed conventionally performed salpingostomy. 74 women (23%) had one term pregnancy after primary salpingostomy and 12 women (18%) after repeat salpingostomy. Over half the women having a term pregnancy subsequently had a second infant. The tubal damage was classified in four stages according to the degree of mucosal damage and tubal fibrosis, the presence of isthmic disease and the quality of tubal and ovarian adhesions. Approximately one quarter of patients had stage I disease and amongst these 39% had babies after primary salpingostomy and 25% after repeat salpingostomy.
Conclusion—Microsurgical salpingostomy is a specialized procedure. Proper selection of patients, competent microsurgical technique and adequate follow-up appear crucial to success. In selected patients treatment by salpingostomy gives better results than multiple cycles of in vitro fertilization.

Increasing use of in vitro fertilization (IVF) for women with tubal inflammatory disease had led to decreasing focus on the possibilities that tubal microsurgery offers patients. Lilford & Watson (1990) even believe that IVF has now replaced microsurgery when the distal portion of the fallopian tube is blocked. Treatment of hydrosalpinges undoubtedly gives the least good results of all common fertility operations but in this study we report the results of microsurgery for bilateral distal tubal blockage and the results indicate that salpingostomy is far from being an obsolete operation. Moreover, salpingostomy is the only treatment which offers potential restoration of natural fertility.

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Subjects and methods

Between 1971 and 1988 a total of 388 abdominal operations for salpingostomy were done by surgeons from Hammersmith Hospital; some of these operations were done at local private hospitals. The age range of the patients was 19–44

years (mean 31·5 years); 27 patients were 42 or older. All the couples were carefully investigated before surgery for other causes of infertility, semen analysis, luteal phase plasma progesterone assays, and a postcoital test were performed. A second cause of infertility was not regarded as a contraindication to surgical treatment. Nearly all patients had hysterosalpingography (HSG) before surgery and, before surgery was scheduled, laparoscopy was undertaken by one of the authors or his senior registrar. In most patients treated after 1977, several laparoscopic photographs were also taken for thorough documentation. Because combining laparoscopy with immediate open surgery might be clinically detrimental and psychologically undesirable (i.e., no prior discussion of prognosis or management with the couple), laparoscopy and microsurgery were separated by a minimum of one week.

In this series, only patients who had open surgery are included; results of laparoscopic salpingostomy, of which we have some experience, will be published separately. Salpingostomy is defined in this study as an operation to open the terminal portion of a completely closed fallopian tube; all those who had salpingolysis or fimbrioplasty where one or both tubes were partially patent are excluded. In some patients only one tube was operated on, for example after previous salpingectomy or where we considered that a tube was so badly damaged as to be inoperable. Patients with obvious severe cornual damage or bipolar blockage were also excluded from this study.

Microsurgery

Full microsurgical methods were used. In a few early procedures, magnifying loupes were used, but in 349 patients (90%) a Zeiss operating microscope was used at magnifications between $\times 4$ to $\times 25$. We switched to the microscope because we obtained superior dissection and less tissue damage. Terminal salpingostomy was undertaken except when tube wall fibrosis was so pronounced as to make this not feasible. Micro-electrodiathermy was used routinely, except in nine procedures where a carbon dioxide laser was employed. Our technique has already been described (Winston & Margara 1986) and included precise haemonstasis, isotonic irrigation, avoidance of serosal damage, peritoneal lavage and the administration of antibiotics, and the use of corticosteroids in many patients who also had adhesiolysis. Postoperative hydrotubation was not done, except early in the series in 34 women. Patients were discharged from hospital 4–7 days after surgery, except for five cases who had a wound infection or dehiscence and one other woman with suspected pulmonary embolism, who was discharged fit 10 days postoperatively.

Follow-up

Repeated, meticulous follow-up was considered essential. Some women, usually from overseas, could not be followed regularly, but most were examined one month after surgery and thereafter at 3-month intervals until pregnancy occurred or until discharge from our clinic or admission for IVF. Tests for ovulation and semen analysis were repeated during the sixth postoperative month. Anovulatory patients were given clomiphene and/or gonadotrophins for a minimum of 3 months and usually longer. In 23 couples severe abnormalities of semen quality led to donor insemination being offered; we have incomplete information about the number of cycles undertaken as these couples were generally referred outside Hammersmith. Check laparoscopy was offered to all patients, except those entering the IVF programme, one year after surgery. This was accompanied by closed adhesiolysis when indicated and chromopertubation; HSG was not usually repeated. Of 272 patients having check laparoscopy within approximately one year after salpingostomy, 223 (82%) had at least one tube patent to dye.

The widespread nature of our referral practice means that some women were lost to follow-up. We have assumed that if a woman was lost to follow-up or did not answer inquiries, she had not had a successful pregnancy. Follow-up information was available on all but 47 women (12%) one year after surgery and in 58 follow-up has been maintained for over 10 years. The longest interval to successful pregnancy was 7 years. All patients operated but lost to follow-up are included in our results and reported as failures. This may introduce a slight bias in reporting and it is possible that there have actually been more livebirths than reported.

Results

In 323 patients salpingostomy was a primary pro-

Table 1. Distribution of women with pregnancies after tubal surgery*

Patient group	*n*	Numbers of women having a pregnancy			
		At least one term pregnancy	More than one term pregnancy	Intrauterine pregnancy	Ectopic pregnancy
Primary salpingostomy	323	74 (23%)	39	106 (33%)	32 (10%)
Repeat salpingostomy	65	12 (18%)	7	16 (25%)	6 (9%)
Total	388	86 (22%)	46	122 (31%)	38 (10%)

* Some women having a miscarriage or ectopic pregnancy also achieved a term pregnancy.

cedure, although some of them had already had a laparotomy associated with their infertility. In the remaining 65 women, the salpingostomy was a repeat procedure after previous salpingostomy by other surgeons working without a microscope had resulted in tubal reocclusion.

Overall, 86 women had at least one infant (Table 1); there were two sets of twins, one set identical. Over half the women having one live-birth subsequently had a second infant and 19 had three or more births. One patient, following repeat salpingostomy on her sole tube (removal of the other having resulted from an ectopic), had five separate term pregnancies.

Table 2. Staging of tubal disease in hydrosalpinges

Stage I	Thin-walled hydrosalpinx with little or no fibrosis. Mucosa thrown into folds with no flattened areas. Adhesions (if present) flimsy and limited to the ampulla and ovary only. Ovary present and mainly free.
Stage II	Thick-walled hydrosalpinx with good mucosa. Mucosa flattened with attenuated or few folds but thin-walled tube. Mucosal folds markedly adherent in lumen. Fibrous thick adhesions involving tube and/or ovary.
Stage III	Combination of thick walled hydrosalpinx with marked mucosal damage or thick fibrous adhesions. Clean hydrosalpinx with thin wall but with nodularity of patent isthmus. Ovary incarcerated against pelvic side wall or absent on that side.
Stage IV	Tubo-ovarian mass or fibrous, adherent hydrosalpinx with incarcerated ovary and/or isthmic damage.

Assessment of tubal pathology

In 1979 it became clear to the authors that a factor in the outcome of tubal surgery was the degree of tubal damage and the stage of disease. We are indebted to Dr Margit Boer-Meisl of Amsterdam who drew our attention to her own method of classification of tubal damage, which we have modified (Table 2). In a retrospective analysis, when adequate operative records were available and/or good quality laparoscopic photographs and HSG pictures, we scored the degree of tubal pathology into four categories (Table 3). This was possible with reasonable accuracy in 230 of those who had a first salpingostomy and in 61 of those who had a repeat salpingostomy.

Histology from one or both tubes was available for 74 of the women and most showed non-specific inflammatory changes or chronic follicular salpingitis. There were five examples of histologically confirmed tuberculosis; remarkably two of these women gave birth after microsurgery. Tubal epithelial microbiopsies (Brosens & Vasquez 1976) were taken from 48 women and mucosal ciliated cell counts were made within a few weeks of salpingostomy before the clinical outcome was known. Ciliated cells were counted using scanning electron micrographs and semi-thin sections by methods described previously (Vasquez *et al.* 1982). These patients were then followed prospectively and the outcome related to ciliated cell counts (Fig. 1).

Discussion

In their recent commentary in this journal, Lilford & Watson (1990) state that salpingostomy is obsolete. The present substantial series does not support this contention. Salpingostomy carries very poor results with badly damaged tubes and

Table 3. Pregnancy outcome related to stage of disease in the better or only tube

Patient group	*n*	Term pregnancy	Ectopic pregnancy
Primary salpingostomy ($n = 230$)			
Stage I	56	22 (39%)	8
Stage II	99	20 (20%)	12
Stage III	58	5 (9%)	2
Stage IV	17	1 (6%)	0
Repeat salpingostomy ($n = 61$)			
Stage I	44	11 (25%)	4
Stage II	10	4 (40%)	2
Stage III	6	(0%)	0
Stage IV	1	(0%)	0

only 6 of 82 patients (7·3%) had a successful outcome where the stage of disease was worse than stage II. However, 57 of 209 patients with lesser disease (27%, Table 3) had at least one live birth. These figures underline the importance of proper preoperative management and it is strange that surgeons undertaking this specialized branch of surgery do not recognize that the degree of pathology is a critical factor in results. Gynaecological oncologists have acknowledged this principle for years, and Wertheim hysterectomy is not to be abandoned simply because it is inappropriate for stages III or IV carcinoma of the cervix.

Preoperative assessment requires expertise, both in detailed laparoscopy and in the accurate reading of clearly taken salpingograms. Although it is difficult to assess mucosal pathology before the tube is examined at surgery, tubal fibrosis or concomitant cornual damage can be pinpointed with accuracy on a good radiograph and the quality of adhesions and the state of the ovarian surface are capable of precise laparoscopic assessment. Regrettably, HSG has largely been relegated by most clinicians and few surgeons performing laparoscopy record precise information about tubal and ovarian pathology; regular documentation by photography—a cheap, effective record—is almost unknown in Britain.

A disappointing feature is that most patients with hydrosalpinges have relatively badly damaged tubes. Only 56 out of 230 women undergoing primary salpingostomy had damage classified as stage I; this proportion (24%) is probably representative of hydrosalpinges *in*

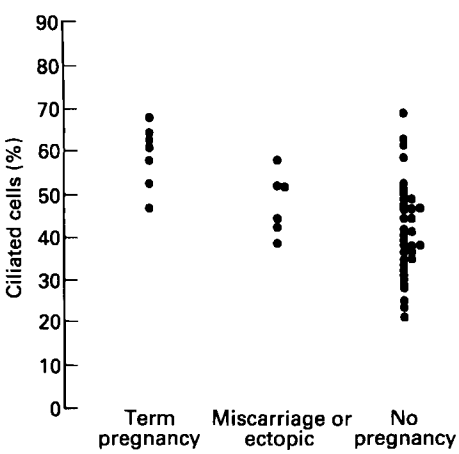

Fig. 1. The percentage of ciliated surface area from tubal microbiopsies taken at 48 primary operations. More patients with successful pregnancy had good ciliated epithelium. Term pregnancy: median ciliated surface 59.2% (SD 7·4); failed pregnancy: median ciliated surface 49% (SD 7·4); not pregnant: median ciliated surface 39% (SD 11·8). These differences were not statistically significant.

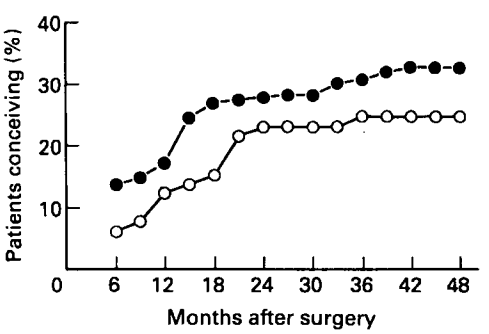

Fig. 2. Cumulative conception expressed as percentage of patients conceiving at 3-month intervals. There was a slight increase in conception rate immediately after completion of one year's follow up which is not statistically significant. —●—, Primary salpingostomy; —○— Repeat salpingostomy.

general as we offered tubal surgery to most patients who had not had a previous salpingostomy. We were much more selective in offering surgery if this had already failed and the 65 women who had repeated salpingostomy were carefully picked. Only 100 of all patients had disease which could be classified as stage I, but 33 of these had term pregnancies. In such women, particularly those that are relatively young, tubal microsurgery should be the treatment of choice. Opting for surgery does not preclude subsequent IVF and, in our practice, we increasingly offer both treatments in tandem.

Of the 106 women in the primary salpingostomy group who had at least one intrauterine pregnancy, 55 occurred within one year of the procedure, of the 16 intrauterine conceptions in the repeat salpingostomy group, six occurred within one year of the procedure.

Conception seldom happened immediately after surgery (Fig. 2). Conception was more rapid in those patients with stage I disease in both groups. Conception rate improved slightly after one year. This effect has been attributed (Gomel 1978) to epithelial regeneration, though there are no hard data. Another possible explanation for this effect is that check laparoscopy was usually performed one year after microsurgery and a number of pregnancies happened within two to three months of laparoscopy—perhaps the result of washing through the tubes by hydrotubation at the time of laparoscopic examination. The delayed return to fertility is a definite disadvantage when compared to IVF but the reassurance that a woman feels at being able to conceive naturally after completed treatment was a major benefit to many patients. Moreover, more than half the patients who gave birth had more than one child without extra risk of multiple pregnancy.

It is our impression that open salpingostomy may be better than that done laparoscopically. Open microsurgery gives better anatomical results; at check laparoscopy one year after surgery, complete bilateral reocclusion was observed in only 12% of women after 181 microsurgical procedures compared with 37% after 37 laparoscopic operations (14 cases). Tubes with more pronounced damage were more likely to reocclude and, in general, most of our laparoscopic salpingostomies have been done when there was minimal damage only.

Repeat salpingostomy is a procedure which has been mostly abandoned by surgeons. Our report includes the biggest published series of repeat salpingostomies and it demonstrates that even repeat salpingostomy is helpful in certain patients with limited damage. All the repeat operations were after failed 'gross' surgery. These results suggest that the degree of tubal pathology and the use of microsurgical technique influence success.

Tubal surgery, including salpingostomy, should not be halted in favour of IVF. The results of salpingostomy in our hands and in the hands of surgeons trained by us do not support this view. The term pregnancy rate overall was better than that achieved by nearly all IVF programmes, and in patients with stage I disease was better than four times the national average for a single IVF treatment cycle (9·1%, ILA report 1990). It is ludicrous to suggest that repeated cycles of IVF compare favourably with microsurgery in this latter group of women. The cost of four cycles of IVF will be a minimum of £4000 and even more treatments would be required for couples to have a completed family. Moreover, IVF programmes cannot cope with the demand. The ILA report that only some 7000 women received one or two treatments last year; most National Health Service programmes have very long IVF waiting lists. It is unrealistic to suppose that IVF can currently meet the need of most women with the common problem of tubal blockage.

The authors confess to being unrepentant tubal surgeons. The results we report are not isolated; other practitioners of microsurgery, all overseas, have published comparable results in smaller series (Swolin 1975; Gomel 1978; Salat-Baroux *et al.* 1979; DeCherney & Kase 1981; Larsson 1982; Wallach *et al.* 1983; Lauritsen *et al.* 1983; Sadoul *et al.* 1984; Donnez & Casanas-Roux 1986; Kitchin *et al.* 1986). We jointly run one of the largest and more successful of the IVF programmes in Britain but are convinced that, with experienced selection of cases, tubal microsurgery is an effective and important treatment. Salpingostomy still has a place, particularly in young women and those with limited tubal damage. It remains the treatment of choice for some, but must be done using good microsurgical technique and with regular follow up. It is not acceptable to offer these unfortunate women crude surgery which has little or no chance of success and which simply delays effective management. Microsurgical salpingostomy is a specialized procedure and it would be preferable to ensure

better training in the selection and management of these patients rather than to turn to the expensive and often inappropriate option of IVF. Regrettably, the sub-specialty training programmes of the Royal College of Obstetricians and Gynaecologists have paid insufficient attention to the value of microsurgery in the United Kingdom and this deficiency needs urgent redress.

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