Technical Problems and Early Complications of Laparoscopic Sterilization Done on a Day-Case Basis

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SUMMARY

Two hundred and sixteen patients were selected for laparoscopic sterilization on a day-case basis. Patients were sterilized by electrocautery, by applying Silastic bands (Falope rings), and by means of Hulka-Clemens clips. Three patients required laparotomy and 35 patients were discharged the day after the operation. By the 3rd day 146 (69%) and by the 5th day 184 (86%) patients had returned to their routine work.

From the technical and immediate postoperative point of view, there appears to be a relatively little difference between the three techniques. There may be slightly more risk of thermal complications with bipolar cauterization, a slightly higher incidence of postoperative abdominal pain with the Silastic band applicator, and slightly more difficulty in applying the Hulka-Clemens clip. These problems are all reduced by experience and proper training of the operator, which is essential.

Our experience confirms that laparoscopic sterilization is safe, efficient, and feasible as a day-case procedure, and that it has major advantages in terms of patient convenience and acceptability as well as reduction in hospitalization costs.


Many patients most in need of a permanent method of contraception, because they have large families and are often in poor socio-economic situations, will not seek sterilization, as laparotomy usually involves a number of days in hospital followed by 1-2 weeks' convalescence.

To meet this need, and at the same time to evaluate techniques recently introduced into South Africa, it was decided to embark on a programme of day-case laparoscopic sterilization. This article deals with the immediate operative and technical problems, and the early complications of laparoscopic sterilization. The patients are being followed up for a minimum of 12 months; a second article will incorporate a review of the 12-month experience.

SUBJECTS AND METHODS

Patients were selected in the Family Planning Clinic, Groote Schuur Hospital, for laparoscopic sterilization. Those with a mass over 80 kg, with previous operations through a subumbilical midline incision, or with significant gynaecological abnormalities were excluded, as were patients who had pulmonary or cardiac lesions. Approximately 40% of patients were excluded, mainly because of obesity.

The patients were fully counselled about the technique, including the possibility of laparotomy, and were given written instructions on how to prepare for the operation. They were starved after midnight and admitted at 07h30 on the day of the operation. Whenever possible, the procedure was performed early on the theatre list. Five gynaecologists skilled in laparoscopy participated, and endotracheal anaesthesia was always used.

Dilatation and curettage was performed before sterilization, and the Hulka controlling tenaculum was used to manipulate the uterus. Only a unipolar cautery was available at the onset of the study, but when a bipolar cautery became available it was given preference, because it has been shown to be safer since the diathermy current only passes through the blades of the grasping forceps. A double puncture technique was used. The fallopian tubes were cauterized but not divided.

When Fallope rings (KLI, Ivyland, Pa, USA) became available, they were incorporated in the study. These are siliconized rubber bands with an inner diameter of 1 mm which are placed over a knuckle of fallopian tube to occlude it. It was decided to do half the series with this method, again using the double puncture technique. The Hulka-Clemens clip (Rocket of London Ltd, Herts, UK) became available toward the end of the study, and 9 patients were sterilized with this method. The clip consists of two plastic jaws; when these are closed over the fallopian tube, a gold-plated stainless steel spring is pushed forward over the plastic jaws to maintain adequate pressure and occlude the lumen. As a cautery is not used in either of these methods, thermal injuries to structures other than the fallopian tubes are avoided. Black silk was used for suturing so that postoperative assessment could be carried out when the patients returned on the 7th day. Patients were discharged within 6 hours of surgery unless there were good reasons for not doing so.

RESULTS

The average age of the 216 patients studied was 34 years. Twenty-two patients had had previous abdominal operations, viz. appendicectomy (20), caesarean section (1), and wedge resection (1). The method selected for tubal occlusion was by unipolar cautery (4), bipolar cautery (92), Silastic band (108), and Hulka-Clemens clip (9).
Operative Failures

In 2 cases, laparoscopic sterilization could not be performed. Because of abdominal obesity, pneumoperitoneum could not be achieved in 1 patient although her mass was only 61 kg. Extensive adhesions and a retroverted uterus made the procedure impossible in the second case.

Operative Problems

Operative problems were encountered in 49 patients (Table I). Perforation of the uterus occurred in 6 cases during curettage. Three of these patients were on a combined oral contraceptive pill, 2 were on a depot preparation of medroxyprogesterone acetate, and 1 was on a progesterogen-only pill. In 10 patients there was difficulty in obtaining adequate pneumoperitoneum, but the procedure was completed in 9 patients.

<table>
<thead>
<tr>
<th>TABLE I. OPERATIVE PROBLEMS</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perforated uterus</td>
<td>6</td>
</tr>
<tr>
<td>Problems with pneumoperitoneum</td>
<td>10</td>
</tr>
<tr>
<td>Adhesions</td>
<td>22</td>
</tr>
<tr>
<td>Poor visualization</td>
<td>8</td>
</tr>
<tr>
<td>Tubal transection</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>49</strong></td>
</tr>
</tbody>
</table>

Of the 22 cases with visible adhesions, only 9 caused difficulty, 1 needing a laparotomy. There were problems with visualization due to malfunction of the laparoscope in 8 cases. In 3 patients the tube was inadvertently transected, and this was associated in each case with the use of the Falope ring. These were adequately treated by applying Falope rings to the transected ends. One patient required laparotomy after sterilization because of uterine bleeding due to perforation of the uterus during curettage.

Postoperative Course

The 3 patients who required laparotomy are excluded from subsequent analysis. One hundred and seventy-eight patients were discharged on the day of the operation, 33 the next day and 2 on the 2nd day. The delayed discharge was related to the operation or to anaesthesia in only 19 patients — perforation of the uterus (5), transection of the tube (3), pain, dizziness, pyrexia and vomiting (9), extrasystoles (1) and transient hypertension (1). In the remaining 16, the delay was either due to transport difficulties or for the convenience of the patient.

Follow-Up

Apart from postoperative pain, no serious problems were encountered at the follow-up visit 7 days later. Painful throat was commonly due to intubation, and generalized pain was due to the use of scoline, but the main sites of pain were the abdomen and shoulders. This was probably due to the procedure, and the incidence according to technique used is tabulated in Tables II and III. Women who were sterilized with Falope rings experienced more abdominal pain than those sterilized with a cautery, and the difference is statistically significant up to the 3rd day (days 1 and 2, \(P>0.01\); day 3, \(P>0.05\)).

| TABLE II. NUMBER OF PATIENTS WITH SIGNIFICANT ABDOMINAL PAIN DUE TO TECHNIQUE |
|-------------------------------|-----------------|
| Day  | Falope ring \((N = 108)\) | Bipolar cautery \((N = 92)\) |
| 1    | 48                           | 22*                        |
| 2    | 31                           | 10*                        |
| 3    | 14                           | 3†                         |
| 4    | 5                            | 1                          |

* Difference between bipolar cautery and Falope ring statistically significant \((P<0.01)\).
† Difference statistically significant \((P<0.05)\).

| TABLE III. NUMBER OF PATIENTS WITH SIGNIFICANT SHOULDER PAIN DUE TO TECHNIQUE |
|---------------------------------|-----------------|
| Day  | Falope ring \((N = 108)\) | Bipolar cautery \((N = 92)\) |
| 1    | 27                           | 32                          |
| 2    | 10                           | 18                          |
| 3    | 4                            | 6                           |
| 4    | 1                            | 2                           |

The differences between Falope rings and cautery are not statistically significant.

Although there appeared to be more shoulder pain in the cautery group, the difference is not statistically significant. The patients' return to work or housework was remarkably quick. By the 3rd day 146 (69%) patients and on the 5th day 184 (86%) patients were feeling fit enough to cope with their pre-operative activities. By the 7th day, 98% of the patients were performing their normal duties.

DISCUSSION

Although there were technical difficulties and operative problems, these were uncommon and not serious. The great care taken in pre-operative selection of patients was a major factor in avoiding unexpected medical and technical complications, thus allowing 82% of the women to be discharged on the same day.

In only 2 cases (0.9%) was it impossible to perform a laparoscopic sterilization. This failure rate is similar to that in a much larger series published by Brenner et al., who reported a 1.5% failure rate using clips, 0.04% failure with electrocautery, and no failures with the Falope ring. These techniques would not have been possible in either of our 2 failures.

Technical difficulties were often due to poor visualization because of sub-optimal laparoscopes. A good optical system and adequate lighting are essential for operating through a laparoscope.
Although a high incidence of pelvic inflammatory disease is reported in the population studied, adhesions were not as great a problem as expected. In 13 patients adhesions caused difficulties but it was only necessary to abandon the technique in one instance. Previous surgery in 22 subjects did not give rise to technical difficulties. However, patients with midline scars were excluded by selection.

Retroversion of the uterus was not a problem provided the uterus was not fixed. A mobile uterus could always be positioned and the tubes adequately exposed by using the Hulka-controlling tenaculum.

The most serious complication was perforation of the uterus during dilatation and curettage. Mishell et al. have shown that women who take medroxyprogesterone acetate have decreased levels of endogenous oestradiol to follicular levels, and the size of the uterus appears to be diminished. This atrophic effect may be associated with softening and thinning of the uterus which may increase the risk of uterine perforation. Therefore, patients who have had a Depo-Provera (medroxyprogesterone acetate) injection in the 3 months before surgery are no longer subjected to routine curettage.

There were no further serious problems in the cauter group, but in 3 out of 108 patients (2.8%), the fallopian tube was accidentally transected while applying the Falope ring. This has been reported by other authors; Kumarasamy and Hurt and Yoon et al. reported an incidence of 1.5% and 2.5% respectively. As in other series, our tubal transections occurred early on and were probably due to the laparoscopist having to adapt to a new technique. This complication may be avoided by appropriate training and by careful selection of patients. Women with thick, inflamed tubes, and those with limited mobility of the adnexa due to adhesions should be excluded.

The following technique should be carefully adhered to: the tube should be gripped 3 cm from the corner at its thinnest portion. It is lifted gently with the grasping forceps to ensure that only the full circumference of the tube is held. The applicator should be advanced as the loop of the tube is being drawn slowly into the inner cylinder of the applicator, care being taken to avoid traction on the tube and tearing of the mesosalpinx.

There seemed little difference between the use of cautery and Silastic bands in this series, although the possibility of a bowel burn or other thermal injuries is present even with bipolar cautery. Thus the consequences of cautery are more serious than the complications reported with the Silastic band. The fact that the tubes were not divided after cauteration probably decreased the risk of complications in this group.

Postoperative pain was the only problem reported after 7 days. The main sites were in the abdomen and shoulder. Since the Silastic band forms a knuckle of ischaemic tissue, it can be expected to produce more abdominal pain. This was borne out by our experience. The tubes were covered with xylocaine jelly before the ring was applied, but although immediate postoperative abdominal pain was decreased, the incidence of subsequent pain was not reduced. This experience is similar to that reported by Pelland.

The higher incidence of shoulder pain in the cauter group is not statistically significant, and might be due to the slightly greater volume of carbon dioxide used for the pneumoperitoneum. Shoulder pain can be decreased significantly by careful expression of most of the gas in the peritoneal cavity after completion of the procedure.

There were no mishaps during the creation of a pneumoperitoneum or during the introduction of the trocar and cannula. In every case, precautions, as recommended by Palmer, were taken to prevent common laparoscopic accidents such as penetration of bowel or major blood vessels. Laparoscopic sterilization requires skill and experience, and doctors who desire to offer such a service should preferably first attend a special training programme at an appropriate centre. Assessing such a brief but intensive training programme at the University of North Carolina, Hulka et al. reported that it resulted in rates for complications and failure similar to national rates despite the inexperience of the participants.

CONCLUSION

The purpose of this study was to evaluate laparoscopic sterilization using a bipolar cautery, Silastic bands and the Hulka-Clemens clip, on a day-patient basis, in terms of technical feasibility and complications, postoperative problems, patient acceptability, and long-term follow-up of possible failure, pregnancies and side-effects. Our initial experience confirms that laparoscopic sterilization is safe and effective and in the majority of cases easy, quick to perform and without significant postoperative complications. The fact that 82% of patients could be discharged on the same day, and that 85% of patients had resumed full normal activity by the 5th day after operation confirms that laparoscopic sterilization is a feasible and reasonable day-case procedure. We believe the method has wide applicability with major advantages in terms of reduction in hospital costs, and more particularly in patient convenience and acceptability.

We should like to acknowledge the help of KLI (Pennsylvania, USA) and their local agents, Triton Enterprises, in supplying the instrumentation and Falope rings for the Falope ring part of this study. We would also like to thank Sister A. Parfitt, who organized this study and collected the data, and Dr H. H. Broodryk for assistance.

REFERENCES