Female Sterilization By Mini-Laparotomy

Using a tiny incision in the lower abdomen 2.5 to 3 cm long, physicians in several different countries are now perfecting mini-laparotomy, a technique for female sterilization that may prove valuable in family planning programs around the world. In the mini-laparotomy procedure—or mini-lap, as it is sometimes called—a small suprapubic incision is made and the uterus is manipulated to bring the fallopian tubes into the field of vision. Because of the small incision, local anesthesia may be substituted for general anesthesia. This simplifies the procedure and reduces recovery time, making it possible to perform mini-lap on an outpatient basis.

This procedure is not entirely new. A small incision at the pubic hairline—traditionally known as a mini-Pfannenstiel—has been used for many years to diagnose and treat female pelvic disorders. Also, sterilizations have often been performed after childbirth using a small abdominal incision. What is new about mini-laparotomy is that it can readily be used for interval sterilization (performed at times other than following childbirth or abortion) under local anesthesia on an outpatient basis.

Although trials of the procedure to date include less than 5,000 women, preliminary reports from Thailand, the Philippines, and the United States suggest that the mini-laparotomy approach can be adapted to various methods of tubal occlusion. Dr. Vitoon, for example, working at Ramathibodi Hospital and Mahidol University in Bangkok, makes a mini-laparotomy incision and then performs a standard Pomeroy tubal ligation under direct vision. Dr. Pramote, also in Bangkok, inserts a proctoscope through the incision to locate the tubes before performing the ligation. In the Philippines, Vitoon’s technique is being applied. In the USA, at The Johns Hopkins Hospital, Pramote’s technique has been successfully tested. Other physicians are developing their own variations to suit local and personal preferences.

Similar to laparoscopy in that it requires only a small incision, mini-laparotomy is unlike laparoscopy in that it permits direct visualization of the fallopian tubes which are brought through the incision for ligation or other occluding techniques. Special endoscopic training and equipment are not necessary. However, a proctoscope may be used to aid vision. In addition, the procedure can be adapted to different local conditions depending on available medications and instruments. With ordinary surgical skills, a physician can perform the operation in 10 to 30 minutes. The patient recovers in one to four hours with a scar that eventually disappears from view.

To date, the complication rate is low. In Thailand where 2,800 women have been sterilized by Vitoon’s procedure, the average complication rate is 0.8 percent; 6.5 percent of Pramote’s patients experienced difficulties but these occurred early in the series. No complications were reported in the 30 procedures at Johns Hopkins.

The long-term acceptability of any sterilization program, of course, depends on satisfied clients. Many of Vitoon’s patients in Thailand travel long distances back to their

CONTENTS

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>History ........................................ C-54</td>
</tr>
<tr>
<td>Preoperative Preparation .................. C-54</td>
</tr>
<tr>
<td>Anesthesia .................................... C-54</td>
</tr>
<tr>
<td>Procedure ..................................... C-55</td>
</tr>
<tr>
<td>Postoperative Care .......................... C-57</td>
</tr>
<tr>
<td>Contraindications ............................ C-57</td>
</tr>
<tr>
<td>Complications ............................... C-57</td>
</tr>
<tr>
<td>Failures ...................................... C-58</td>
</tr>
<tr>
<td>Equipment .................................... C-58</td>
</tr>
<tr>
<td>Training ...................................... C-59</td>
</tr>
<tr>
<td>Research ...................................... C-59</td>
</tr>
<tr>
<td>Bibliography .................................. C-59</td>
</tr>
</tbody>
</table>

This Population Report on sterilization via mini-laparotomy was prepared by Judith Wortman, R.N. on the basis of published and unpublished papers, personal interviews, and correspondence.

The assistance of the following reviewers is appreciated: Drs. Louis Keith, Theodore King, Leonard Laufe, Ira Lubell, Vitoon Osathanondh, Pramote Rattakul, John Sciarra, J. Joseph Speidel and Frank Spencer Stubbs.

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homes two to four hours following sterilization. Once home, they are closely scrutinized by neighbors who are curious about the state of their health. The healthier the patient, the more likely it is that other women will want the procedure for themselves. So far, Vitoon reports that each of his patients has referred about three other women for the procedure.

HISTORY

Laparotomy via a small abdominal incision is an established procedure. It was first described for postpartum sterilization by Uchida (Uchida Hospital, Kanazawa, Japan) and his colleagues in 1961 (13). For interval female sterilization, however, mini-laparotomy is relatively new. The specific techniques discussed in this Population Report were developed in the 1970s.

In 1972, W. G. Saunders and R. A. Munsick of the University of New Mexico School of Medicine reported on their technique for interval female sterilization which requires a 1.5 to 3 cm incision at the margin of the pubic hair. A Semm vacuum cannula was used to antevort and elevate the fallopian tubes into the incision site. The operation was performed under general anesthesia and the patients remained in the hospital 48 to 65 hours (10). About the same time, John Lyle at Dartmouth Hitchcock Medical Center in Hanover, New Hampshire (USA), also performed the same procedure using general anesthesia. Fifty percent of his patients arrived at the hospital the morning of the scheduled sterilization and departed that same evening (4).

Frank Stubbs (Texas, USA) developed the technique still further using only local anesthesia and performing both the incision and the tubal occlusion with cautery equipment. Thus he shortened the time for combined surgery and recovery to less than four hours, in effect, creating a true outpatient procedure (12).

In 1973, Vitoon Osathanondh (Thailand) developed another simple mini-laparotomy procedure using local anesthesia and ordinary surgical equipment. In Thailand, 112 surgeons have performed 2,800 mini-lap sterilizations, 400 at Ramathibodi and 2,400 in rural hospitals and health centers. This method of female sterilization is particularly suited to areas where general anesthesia and electrocautery may not be available (6,7). Vitoon's procedure has now been successfully tested in several other developing countries. In the Philippines, from May to October 1974, Dr. Ruben Apelo sterilized 75 women using this technique.

Use of a proctoscope for mini-laparotomy was first described by T. C. Stevenson at St. Mary's Hospital in England in 1971. He performed the operation using general anesthesia on 50 women, most of whom remained in the hospital for 48 hours postoperatively (11). Mini-laparotomy with a proctoscope is now being performed with local anesthesia on an outpatient basis by Pramote Rattakul of Ramathibodi Hospital in Thailand (6,9). With some modification, Pramote's procedure has been performed on 30 women at The Johns Hopkins Hospital, Baltimore, Maryland (USA) by Julian Meyer (3).

PREOPERATIVE PREPARATION

Only minimal preoperative preparation is required. The patient arrives at the clinic or hospital after fasting for eight hours. Laboratory studies, a physical examination and counseling are performed one day to one week before the procedure (6,7,12).

Patients are usually given a tranquilizer preoperatively to reduce their anxiety. Vitoon gives each patient 10 mg of diazepam (Valium) with 30 cc of water orally on arrival at the hospital. Other physicians medicate their patients more heavily by giving an intramuscular injection of a tranquilizer or sedative combined with a narcotic analgesic such as meperidine hydrochloride (Demerol) (2,12).

On the operating table the patient is helped into a supine position with legs apart or into a lithotomy or modified lithotomy position. The pubic hair is shaved either before or after arrival in the operating room. Most physicians prefer to catheterize the patient and retain the catheter during the operation so that the bladder remains empty and out of the operative field (7,9). Because there is always a risk of bladder infection with catheterization however, King suggests omission of the catheter if the patient can void just before the operation (3).

After a bimanual examination to determine the shape, size, and position of the uterus Vitoon inserts a bivalve speculum into the vagina and cleanses the upper part of the vagina and cervix with an antiseptic solution. The lower abdomen is also scrubbed with an antiseptic solution and covered with sterile drapes leaving only a small area open for the incision (7).

The operating table is then readjusted to place the patient in a Trendelenburg (head low) position. This causes the intestines to fall away from the incision site. Vitoon's patients, who are awake, are encouraged to relax the abdomen in order to keep the bowel out of the way (7).

ANESTHESIA

With the patient sedated, Vitoon, Pramote and Apelo perform the mini-laparotomy under local anesthesia. An intravenous infusion of dextrose in water or saline may be started to keep an arm vein open for the administration of a narcotic analgesic (meperidine hydrochloride) five minutes before the procedure (2,6,7,8,9).
In Thailand, mini-laparotomy is frequently performed under local anesthesia without additional medication. On the other hand, at The Johns Hopkins Hospital in Baltimore, women found the procedure painful with only local anesthesia, and therefore spinal or general anesthesia was used (3). Although it is possible that Asian women have a higher pain threshold than American women, it is also true that the operation is easier and thus less likely to cause pain when performed on Asian women who usually have thinner abdominal walls and flatter pelvises.

Although Stubbs operating in Texas often uses only local anesthesia, he premedicates his patients much more heavily than the Asian physicians and uses a paracervical block for insertion of the Semm cannula. He often administers a light analgesic such as ketamine, fentanyl plus droperidol (Innovar), or sodium methohexital (Brevital Sodium) during the procedure. When the patient is unusually apprehensive or cannot tolerate discomfort, he chooses a short-acting general anesthetic (50-percent nitrous oxide-oxygen and halothane via mask without intubation) (12).

For the local anesthesia, Vitoon uses 0.5 percent lidocaine (Xylocaine) with 1:200,000 adrenalin. Employing a 1 1/2 inch No. 20 needle and a 20 cc syringe, Vitoon infiltrates about 10 to 15 cc of the anesthetic subcutaneously into the operative area. About 5 to 10 cc of Xylocaine is infiltrated into the parietal peritoneum. More local anesthesia may be required if the patient feels pain during the procedure (6).

**PROCEDURE**

The mini-laparotomy procedure—from the time the woman reaches the operating room until the operation has been completed—takes 10-30 minutes.

**Uterine Manipulation**

In order to accomplish the sterilization through the small incision, the fundus of the uterus must be elevated and rotated toward the incision so that the tubes can be reached. This can be accomplished by such instruments as a uterine sound, a uterine biopsy curette, Semm’s uterine vacuum cannula, a cannula for utero-tubal insufflation, or Hulka’s uterine controlling tenaculum. Vitoon has specifically designed a uterine elevator (mobilizing device) to perform this function (see Figs. 1 and 2).

When a proctoscope is inserted into the incision for better vision, less manipulation of the uterus is necessary. If the uterus is retroverted, Pramote antverts it with an index finger inserted through the incision. If the uterus cannot be maintained in the antverted position, a uterine elevator like Vitoon’s can be used. At Johns Hopkins the same instruments are used to manipulate the uterus in mini-laparotomy as in laparoscopy (Jacob’s tenaculum, Rubin’s cannula). Since the physician manipulates the uterine instrument himself during the sterilization procedure, the handle may be covered with sterile cloths to prevent contamination.

**Incision**

The small mini-laparotomy incision is less traumatic for the woman than the standard laparotomy incision which is three times larger. A transverse incision is made about 2 to 2.5 cm above the symphysis pubis and below the suprapubic crease (see Fig. 3). Vitoon, operating in a simple setting, makes an incision 2.5 cm in length using a scalpel to cut and a curved scissors to separate tissue.

The incision is made in layers as tissue and fascia are exposed. After the skin incision, the subcutaneous tissue or fat is cleared away by blunt dissection until the anterior rectus fascia is reached. At this point, Stubbs separates the rectus abdominis muscles longitudinally in the midline by blunt dissection to expose the posterior rectus fascia and peritoneum (12). Vitoon, on the other hand, incises the rectus sheath transversely for 5 mm. After the cut edges are secured with hemostatic clamps, the incision is widened 1 cm on each side in a transverse line with a scissors. The underlying pyramidalis muscles are dissected off the rectus sheath 1.5 cm above and below the incision. Approximately 2.5 cm of the connective tissue between the muscles is dissected vertically and bluntly with a hemostatic clamp. When the peritoneum is reached, it is lifted by hemostatic clamps and a 2 cm incision is made to expose the pelvic cavity (6).

**Interruption of Tubal Patency**

Although theoretically mini-laparotomy may be used with any method for occluding the fallopian tubes, including the Yoon band or Hulka clip (see Population Report Series C, Number 4, March 1974), only four methods have been reported to date—the Pomeroy or modified Pomeroy ligation technique, the Madlener ligation technique, excision of the ampullary portion of tube, and electrocautery.

In Vitoon’s procedure, the abdominal incision is retracted to open an operative field about one-inch square. By
Fig. 3. A 2.5 cm skin incision is made with an ordinary scalpel about 2 cm above the upper border of the symphysis pubis.

Moving the handle of the uterine elevator the physician brings the uterine fundus and the proximal part of each fallopian tube in turn to the incision. About 1 cc of 0.5 percent Xylocaine is dripped onto each tube. After waiting 30 seconds for it to take effect, Vitoon gently picks up the tube with an atraumatic forceps (see Fig. 4) or a tubal hook which he has designed for difficult cases (see Fig. 5). After identifying the fimbrial end to verify the tube, Vitoon proceeds with a Pomeroy ligation (see Fig. 6).

Pramote makes an abdominal incision similar to Vitoon, but once the incision is made, he inserts a McEvedy proctoscope through the opening. Any proctoscope with a sliding panel may be used. After the obturator is removed, the tip of the scope is moved toward the uterus until one of the fallopian tubes can be identified and picked up with a Babcock forceps. Then, the sliding panel of the proctoscope, followed by the proctoscope itself, is removed from the incision. While retractors hold the incision open, Pramote brings the fallopian tube gently to the surface with a second Babcock forceps and performs a Pomeroy ligation. If the patient complains of pain, local anesthesia is either sprayed onto the tube or injected into the mesosalpinx. Figures 7 and 8 show the proctoscopic method of sterilization as performed at The Johns Hopkins Hospital.

Although not currently practiced, it is possible to apply a Yoon band or Hulka clip via mini-laparotomy. As these methods are perfected they may further simplify the procedure by eliminating the need to tie the tubes after they are brought out through the incision. Instead of lifting the tubes the band- or clip-applicator would be inserted through the incision to grasp the tube and slip the band or clip onto it (3).

Electrocautery is used by Stubbs for tubal occlusion after enveloping a knuckle of the tube with an insulated tonsil snare. Electrocautery introduces a hazard of burns, however, and may be inappropriate where electric current is uncertain. Because the tubes can be directly visualized, to date ligation techniques are preferred.

**Closure of the Incision**

The incision is closed in layers. Using fine No. 00 chromic catgut, Vitoon, Pramote and Apelo first close the peritoneum with a purse-string suture and then the rectus sheath with a figure-of-eight suture (2,6,7,8,9). The incision in the skin and the subcutaneous fat is closed with two silk sutures and then covered with gauze and sealed with tape. The stitches are removed seven days after the procedure (see Fig. 9).

Stubbs closes the peritoneum with a continuous locking suture of 0 chromic catgut. The anterior rectus sheath is closed with interrupted 2-0 merselene or 5-0 stainless steel wire sutures. Interrupted sutures of 3-0 plain catgut are used to close the subcutaneous tissue. Finally, the skin is closed with a subcuticular stitch of a single strand of 5-0 stainless steel wire augmented with skin tape and covered with a band-aid dressing. The wire is removed ten days later (12).

Nonabsorbable skin sutures which require removal by medical personnel are used deliberately by some surgeons.

**Fig. 4.** With the incision held open by retractors, Vitoon brings a loop of fallopian tube through the incision and identifies the fimbrial end of the tube.

**Fig. 5.** An ordinary IUD removal hook, modified for use as a uterine tubal hook by bending the tip into a closed loop at right angles to the stem. Vitoon uses the hook only if there is difficulty in bringing the fallopian tubes through the incision.

**Fig. 6.** Pomeroy ligation is performed on the fallopian tube as in Vitoon's procedure. A ligature is applied to the base of a loop of tube and the top of the loop is cut off.
so that women must return for follow-up care. In areas of Thailand where it is not feasible for the women to return, a local health worker visits her at home to remove the stitches and check her condition. If preferred, absorbable skin sutures can be used instead of silk.

**POSTOPERATIVE CARE**

After mini-laparotomy, minimal postoperative care is required, since most women recover quickly—within one to four hours. Although Vitoon’s and Pramote’s patients are able to walk immediately after the operation, they are advised to rest two or three hours until all drowsiness and/or dizziness passes (6,7,8,9). Ordinary analgesics, such as aspirin, are given for postoperative pain. The women are told not to bathe the incision site but instead to keep it dry and clean. Other than avoiding heavy work, there are no restrictions on activity. Women are permitted to resume sexual activity as soon as they wish (7).

**CONTRAINDICATIONS**

Gynecologic contraindications to mini-laparotomy are the same as for other female sterilization procedures. Since the uterus must be manipulated to bring the tubes within easy reach through the small incision, any obstacle to uterine movement, such as adhesions due to endometriosis or pelvic inflammatory disease, offers particular difficulties for this procedure. Local infection must be treated and cleared beforehand (7). Pregnancy in the patient should also be ruled out.

Because the small size of the incision prevents extensive abdominal exploration or treatment, this form of sterilization is not appropriate for women with suspected adnexal pathology (4). If an abnormality is seen or felt during the procedure, however, it is possible to widen the incision to allow corrective surgery (4).

Extreme obesity is a relative contraindication to mini-laparotomy because the pelvic cavity is difficult to reach through multiple layers of fat. Obesity not only makes the operation more difficult, it prolongs the operating time and increases the likelihood of subsequent morbidity (1,8). At the Dr. Jose Fabella Memorial Hospital (Philippines) Apelo and his associates encountered difficulty in exposing the peritoneum in five obese women because only short retractors were available. Once the peritoneum was exposed, the tubes could easily be brought into view. However, operating time was prolonged from the usual 20 to 25 minutes to 34 to 55 minutes on the obese women.

**COMPLICATIONS**

Experience with sterilization via mini-laparotomy is still too limited to present an accurate complication rate. In the first 300 cases performed by Vitoon, three patients (1 percent) experienced difficulties. One woman suffered a uterine perforation by the uterine elevator, which since has been modified; another patient developed a subcutaneous hematoma on the second postoperative day; a third developed a subcuticular abscess which required drainage on the tenth postoperative day (6,7). In all of the 2,800 procedures performed by 112 surgeons at 50 different hospitals and health centers in Thailand, complications ranged from 1 percent to 0.4 percent (5).

The overall morbidity in Pramote’s cases was 6.5 percent, but, as with other new procedures, most complications
occurred early in the series. At first, Pramote used catgut suture to close the incision, but, after four patients developed stitch abscesses which required evacuation and daily dressing, Pramote switched to silk and encountered no abscesses subsequently. There were six cases of small subcutaneous hematomas which absorbed spontaneously. In one patient, the top of the bladder was injured because the incision was made too low in the pelvis. One patient suffered a bronchospasm in response to the neuroleptanalgesic agent droperidol (Thalamonal). The use of a uterine sound to antevert the uterus in one patient caused a perforation and its use was discontinued as part of the procedure. The only serious complication was hemorrhage in one patient who had multiple abdominal adhesions. This required laparotomy under general anesthesia (8).

Because the incision is close to the dome of the bladder, care must be taken to avoid bladder injury. Like Pramote, Stubbs accidentally incised one bladder early in his series of 20 patients. The injury was repaired by a multilayer closure of the bladder with an interrupted stitch of 4-0 chromic catgut. The tubal resection was then performed in the usual manner. Postoperatively, the incision was closed with a Penrose drain inserted into the space of retzius. The drain was removed on the third postoperative day. A Foley catheter was inserted into the bladder to maintain drainage for 10 days and the patient was given antibiotics to prevent infection. Her recovery was uneventful (12).

One death was reported in the Philippines following mini-laparotomy. The cause of death was attributed to accidental bowel injury which occurred when the peritoneum was opened. No uterine perforations, infections, bladder injuries or other complications were encountered among the 75 sterilized women (1).

No complications were encountered in the 30 procedures done at The John Hopkins Hospital.

FAILURES

There were two failures in the 215 women sterilized by Pramote. One involved a patient with pelvic adhesions which prevented the tubes from being brought through the incision. In this case tying the tubes without creating a loop or transecting them was insufficient to prevent conception. The other failure was a preexisting pregnancy. Pramote believes that in the future careful selection of patients will bring the failure rate close to zero (8).

EQUIPMENT

In order to help physicians from developing countries who want to perform the mini-laparotomy sterilization procedure, the US Agency for International Development is assembling a “mini-lap” sterilization kit. The Ramathibodi uterine elevator (mobilizing device) and uterine tubal hook will be included as part of this kit (No. 8), which is expected to be available by early 1975 (see Fig. 10). Inquiries about the kit may be addressed to the following organizations:

1. The International Project of the Association for Voluntary Sterilization
   708 Third Avenue
   New York, New York 10017

2. The International Planned Parenthood Federation
   18-20 Lower Regent Street
   London, SW1Y 4PW, England
   also—Local Family Planning Association offices

3. The Pathfinder Fund
   850 Boylston Street
   Chestnut Hills
   Boston, Massachusetts 02167
   Attention: Mr. Richard Gamble

4. Family Planning International Assistance,
   International Planned Parenthood Federation
   of America
   810 Seventh Avenue
   New York, New York 10019
   Attention: Mr. John Palmer Smith

5. U. S. Agency for International Development—Local mission

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Fig. 10. The instruments listed above are included in the mini-lap instrument kit (Kit No. 8), assembled by USAID.
TRAINING

Training in mini-laparotomy is being offered at the Ramathibodi Hospital in Thailand. Vitoon’s objective for the next two years is to train physicians to perform the procedure in 300 centers in Thailand as well as to train physicians from other countries. A training manual for interested physicians in developing countries has been prepared by the Department of Obstetrics and Gynecology at the Hospital and is available from:

International Project
Association for Voluntary Sterilization
708 Third Avenue
New York, New York 10017
USA

In addition, the Advanced Techniques for Management of Fertility (ATMF) program may soon be offering training in mini-laparotomy (see Population Report, Series J, No. 3, September 1974). Training centers participating in the program are: The American University of Beirut (Lebanon), The Johns Hopkins University (Baltimore, Maryland, USA), The University of Pittsburgh/The Western Pennsylvania Hospital (USA), and The Washington University (St. Louis, Missouri, USA). Candidates must be certified obstetrician-gynecologists or surgeons, affiliated with a clinic, medical school or hospital and either clinical teachers or employed in a family planning program. Physicians from developing countries who are interested in applying should write to:

Office of the Registrar
Advanced Techniques for Management of Fertility
Hampton House
624 N. Broadway
Baltimore, Maryland 21205
USA

RESEARCH

Mini-laparotomy holds promise as a simple, quick, and low-cost method of female sterilization which may be especially useful in developing countries. However, because the procedure is new, more research is needed to determine its overall efficacy. Proposals requesting support for clinical research from investigators in developing countries may be directed to:

Program for Applied Research in Fertility Regulation
University of Minnesota
Suite 226, University Park Plaza
2829 University Avenue, S.E.
Minneapolis, Minnesota 55414
USA

and

International Fertility Research Program (IFRP)
Carolina Population Center
NCNB Plaza
Chapel Hill, North Carolina 27514
USA

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- E-3, Abortion Law & Practice — A Status Report (F, S)
- E-4, Recent Law and Policy Changes in Fertility Control (F, P, S)
- E-5, The 29th Day (F, P, S)

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- F-1, Five Largest Countries Allow Legal Abortion on Broad Grounds (F, P, S)
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- F-3, Uterine Aspiration Techniques (F, P, S)
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- F-5, Postcoital Contraception — Taking Supplies to Villages and Households (F, P, S)
- F-6, Cervical Dilatation — A Review (F, P, S)

PROSTAGLANDINS — Series G
- G-1, Clinical Use of PGs in Fertility Control (F, S)
- G-2, PG Fertility Control Research — Maps & Directory (F, S)
- G-3, A Review: Modulation of Autonomic Transmission by Prostaglandins (F, S)
- G-4, "Prostaglandin Impact" for Menstrual Induction (F)
- G-5, Physiology and Pharmacology of PGs in Parturition (F, P, S)
- G-6, Prostaglandins Promise More Effective Fertility Control (F, P, S)
- G-7, Clinical Use of Prostaglandins for Pregnancy Termination

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- H-1, Condom — An Old Method Meets a New Social Need (F, P, S)
- H-2, The Modern Condom — A Quality Product for Effective Contraception (F, P, S)
- H-3, Vaginal Contraceptives — Time for Reappraisal? (F, P, S)
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- I-2, Self-Supervision — Not Yet Practical

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- J-1, Family Planning Programs & Fertility Patterns (F, P, S)
- J-2, World Fertility Trends, 1974 (F, P)
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- J-4, Breast-feeding — Aid to Infant Health & Fertility Control (F, P, S)
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- J-15, A Guide to Sources of Family Planning Program Assistance (F, S)
- J-16, Media Communications in Population/Family Planning Programs: A Review (F, P, S)
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- L-1, Tobacco — Hazards to Health and Human Reproduction (F, P, S)

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- M-1, IUD Sterilization Equipment Guide (F, P, S)
- M-3, The World Fertility Survey — Current Status and Findings (F, P, S)
- M-4, Age at Marriage and Fertility

INDEX
- Index 1972-1977 (to English edition only)

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