

STERILIZATION WITHOUT
UNSEXINGI. SURGICAL REVIEW, WITH ESPECIAL REFERENCE TO
5,820 OPERATIONS ON INSANE AND FEEBLE-
MINDED IN CALIFORNIA *ROBERT L. DICKINSON, M.D.
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When a lawmaker asks a physician, or when a legislature asks a state medical society for advice on sterilization of the unfit, is an answer ready? It is not. If an answer is made, it can only be of that guess-stuff called opinion—not facts built on follow-up, not technic compared and put to test.

The voluminous literature is based on scanty experience in any one place. For this reason, the committee particularly welcomed an opportunity to see at close range the unpublished work of California, where more elective sterilization has been done than in all the rest of the world together. There, public opinion made its choice twenty years ago between lifelong segregation at the expense of the community, and sterilization for those mentally afflicted or defective who are yet able to support themselves or whose families are able to care for them. Between 1909 and 1928, 5,820 citizens were sterilized, of whom 3,232 were men, 2,705 being insane and 527 feeble-minded, and 2,588 were women, 1,792 being insane and 527 feeble-minded.

A far-sighted citizen, Mr. E. S. Gosney of Pasadena, has organized a survey of the results thus far obtained, which has been under way for nearly three years.

During February, 1928, at Mr. Gosney's request, and at his expense, and through the courtesy of the superintendents of the institutions, I visited California state hospitals to report on the procedure of the medical decisions and on the technic of the surgery. The consideration given to the individual patient and the skill in operative work seem to me to make the experience in this state very weighty evidence on the whole problem. In the present abridged report, only a brief comparison can be made of methods observed and of suggestions submitted.

STAFF CONFERENCES ON PATIENTS

In these California state hospitals, after a patient has been studied, his case is taken up by the full staff at a regular weekly or semiweekly staff meeting, called a clinic. The family record, the judge's report, with its opinion from two physicians, and the new hospital history are read in detail by the physician in charge, together with the results of the physical, mental and laboratory examinations. The patient appears and is questioned by several of the six to ten persons present.

SURGICAL TECHNIC

I report that the care and dexterity shown by the California surgeons compare favorably with high grade surgery in active service anywhere. It may be called expert work in a narrow field. Few cases call for complicated surgery; for example, one in twenty-two in a series of 445 abdominal operations by Dr. Covey of Sonoma. As to technic, the healing wounds in clean

cases may be gathered from the same reporter, who stated that there was primary union in all but 6.5 per cent, and wound infection in 2.2 per cent.

No fatality has occurred since 1920 in a series covering more than 3,000 operations.

VASECTOMY

For closure of the vas deferens, the method used in California is ligation low down, with removal of a small section (fig. 1). Because they are dealing with the insane and feeble-minded, general anesthesia is employed somewhat more frequently than local anesthesia. The preparation is as elaborate as for a laparotomy. The incisions are made on the anterior surface of the scrotum, though the vas lies at the back of the cord.⁶ The opening is just above the epididymis, and about half an inch in length (varying from one-fourth to a full inch). While this incision is long enough to permit the drawing out and dissecting free of an inch or more of vas, the skin contracts enough for a single silkworm stitch to close the wound. It was noted that the large veins were not handled and were rarely seen, that the duct was delicately stripped, and that precautions were taken against postoperative oozing from the tissues separated from the vas, such as its accompanying and attached artery and the group of veins. At Stockton, Patton and Agnew, the tissues—presumably the cremaster fascia and common vaginal tunic and some cremaster fibers—were sutured with catgut to interpose a layer between the cut ends (Fig. 1 *F* and 12), but it was evidently nowhere thought necessary to suspend the testicle by suturing the low recut end to the wound as is done by Orth⁷ and Schmidt,⁸ except that at Stockton this end was included in its tunic suture.

Ligation was done at both ends or else at the upper end alone, and the two procedures were found with about equal frequency. Plain or chronic gut was used, with fine silk at Stockton only.

Steps of Operation.—The testicle is drawn downward; the whole spermatic cord is lifted in a line between the thumb and index finger of each hand (fig. 1), and the vas is rolled up just beneath the skin, standing out clearly between the finger tips. The vessels of the spermatic cord seem to be readily separated from the vas, except with a very thick dartos. A double tenaculum or claw-tipped forceps, such as the Allis, sets its points through the skin as this is held tense. Thus the duct is circled, and as the handles are dropped over sidewise the skin-covered loop is lifted, and the incision through the skin, from one-half to 1 inch, is handily made. At Patton, instead of sharp points, the seizure is made with rubber shielded tips on the forceps. Either thumb forceps or clamps seize the vas and pull out a loop of an inch or more. The tissues are stripped back about an inch with particular attention to the fine artery and the veins lying close to the cord. Sometimes, after clamps are placed, the vas is cut and the clearance of the loosely attached tissues behind it is then made. A clamp has the advantage over the grasp by tissue forceps in that the duct cannot slip out of sight. After the dissecting or pushing back of the loose tissue, a

4. Nürnberger, Ludwig: Die sterilisierenden Operationen an den Tuben und ihre Fehlschläge, Samml. klin. Vortr. 731/34 (Gynäk. 258/61) 1917. Excellent monograph and bibliography.

6. Pellacani, Paolo (Modena): Der Bau des menschlichen Samenstranges, Arch. f. mikr. Anat. 23: 305-335, 1884. Martin, Edward: Genito-Urinary Surgery and Venereal Diseases, ed. 12, Philadelphia, J. B. Lippincott Company, 1920, p. 370.

7. Orth, Oskar: Die Operationen des Hodensacks, der Hoden und ihrer Hüllen, in Voelcker-Wossidlo: Urologische Operationslehre, Leipzig, Georg Thieme, 1924, p. 555.

8. Schmidt, P.: Steinachische Operation. Wien. Rikola, 1922, English edition, London, William Heinemann, 1924.

* From the Committee on Maternal Health.

* Because of lack of space, this article is abbreviated in THE JOURNAL. The complete article appears in the Transactions of the Section and in the author's reprints. A copy of the latter will be sent by the author on receipt of a stamped addressed envelope.

* Read before the Section on Obstetrics, Gynecology and Abdominal Surgery at the Seventy-Ninth Annual Session of the American Medical Association, Minneapolis, June 14, 1928, together with exhibit. Part II reports the general social and legal situation in California, and other states, and embodies material presented in the exhibit.

half-inch or less of vas is cut away. Oozing is searched for and a fine catgut suture ligature on a round needle is used in case of doubt. If tissues are to be interposed between the ends, a buried fine catgut continuous suture whips over three or four bites, and the upper end is ligated with catgut in the groove crushed by the seizure of the upper clamp.

The wound is often collodion sealed, and then straps, bandage or suspensory hold the scrotum quiet. One or two days in bed is the average, with two or three days in the surgical ward.

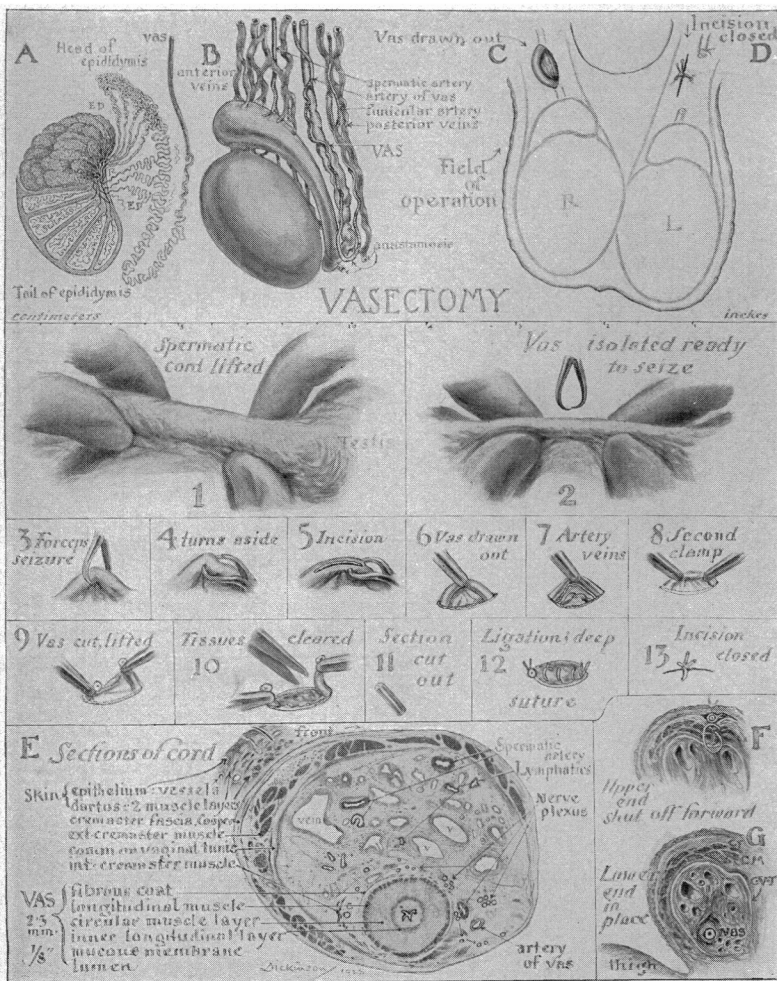


Fig. 1.—Vasectomy: surgical anatomy. A to G; steps of one method, 1 to 13. A, testicle and epididymis: dissection above and diagram of anteroposterior section below. B, left testicle and epididymis above it, seen from the left side, showing artery hugging the vas, and the anterior venous plexus through which the usual operative approach is made, and where varicocele chiefly occurs; compare with cross-section at E and G. C, anterior aspect of scrotum with loop of vas drawn out of incision; the anatomy is indicated by faint lines. D, incision closed by a single stitch; faint lines show the ends of the duct, a ligature on the upper end only. E, cross-section of left spermatic cord, lower third, lower surface (Pellacani); note how far to the rear the vas lies, and the nerve plexus, shown by minute dotted circles, in front and on both sides. E and G raise the question of lateroposterior incision—or the posterior attack endorsed by Martin. In E there is a mere suggestion of the skin with its circular superficial muscular fibers and the longitudinal muscle layer that does the puckering. Both layers are too closely adherent to dissect from the skin. F, diagram of forward displacement of a cut end of vas when the cremaster muscle and the tunics, cremasteric and common vaginal are sutured across the gap between the severed ends, as in 12. G, section of left cord from above, showing scrotal skin cover and relation to thigh. A cut vas left open at its lower end discharges into the loose tissues of the cord the very minute amount of fluid that carries the spermatozoa. The surgical anatomy (A to G) is drawn from Ecker, Charpy, Sappey, Colle, in Poirier, Eberth, Pellacani and Piersol. 1-13, steps of section and ligation just above the testicle; the labels explain the procedure; a Madlener method as done on the uterine tubes would be still simpler; the line showing the scale applies to all drawings except E, F and G.

As to ill effects, Sharp⁹ found none in his 236 institutional sterilizations in Indiana from 1899 to 1908; I

found none in the rejuvenation series of 397,¹⁰ and the California institutions, with an unrivaled experience and unequalled follow-up through keeping patients under observation, have not noted any physical or mental trouble.

Good results in 397 "rejuvenations" are claimed for three fourths of the males who are not too senile, but there have been scant results in younger men whose hormone production is at high capacity anyway. This literature stresses low ligation because, with high ligation, sacculation of the vas may fail to provide strong back pressure, Knud Sand¹⁰ even removing the epididymis, and Steinach, more recently, as he told me in 1926, tying between epididymis and testis. Animal experiments showing interstitial cell growth are numerous, but Oslund¹² declares that this occurs only with intra-abdominal testes and not in animals with a pendulous scrotum. Moore's rabbits¹³ showed that the increase in size was in the epididymis.

Oslund¹² states that the pressure in rats opens the ligated lower end. There will be only minute amounts to exude through any open lower end (fig. 1, 6) into the loose tissues of the scrotum (spermatozoa and a little colloidal material), as the bulk of semen at ejaculation is of course secreted by the prostate and the seminal vesicles. Free exit may prevent aching and that distention of the epididymis which is found sometimes when the vas is reimplanted.¹⁴ Equilibrium between rate of production and absorption is quickly reached in animals¹² and thus distention is relieved and pressure-atrophy lessens.

Altogether, the reports from the younger men on whom vasectomies have been done would appear to bear witness that increased sex urge is not often to be feared from operation on the feeble-minded.

SALPINGECTOMY

At Stockton, Margaret Smyth is expert and gentle. The opening is longitudinal, admits two fingers, and separates the rectus muscles. No gauze goes into the abdomen. The fundus is lifted by the fingers. One curved clamp catches the tube just at the cornu (fig. 2, 1), another about 1½ inches

10. Schmidt (footnote 8). Benjamin, Harry: New Clinical Aspects of the Steinach Operation, M. J. & Record **122**: 1925, pp. 452, 515, 552. Haire, Norman: Rejuvenation (the work of Steinach, Voronoff and others), London, G. Allen & Unwin, 1924. Case histories; good bibliography. Lichtenstern, D.: Die Erfolge der Altersbekämpfung beim Manne nach Steinach, Klin. Wchnschr. **57**, number 42, October, 1920. Sand, Knud: Vasoligature Employed ad mod. Steinach, Acta Chir. Scandinav. **55**: 387-426, 1922. Steinach, E.: Verjüngung durch experimentelle Neubildung der alternden Pubertätsdrüse, Arch. f. Entwicklungsmechanik **46**: 557-618, 1920. Wolbarst, A. L.: A Report on the Steinach Operation in Senility and Premature Senility, New York M. J. **115**: 543 (May 3) 1922.

12. Oslund, Robert: A Study of Vasectomy on Rats and Guinea-Pigs, Am. J. Physiol. **67**: 422 (Jan.) 1924.

13. Moore, C. R.: Vasectomy in the Rabbit, Am. J. Anat. **34**: 317-336 (Nov.) 1924.

14. Martin (footnote 6, second reference). Hagner, F. R.: Sterility in the Male, with Remarks on Operative Experience, J. Urol. **13**: 377, 1925. Young's Urology, 1926, p. 540. Lespinasse, V. D.: Obstructive Sterility in the Male, J. A. M. A. **70**: 499 (Feb. 18) 1918.

15. Kohls, Erna (Klinik E. Meyer, Königsberg): Ueber d. Sterilisation zur Verhütung geistig minderwertiger Nachkommen, Arch. f. Psychiat. **77**: 285-303, 1926. Moderate bibliography. Stern, Maximilian; Folsom, Ralph; and Ritter, I. S.: Vasectomy and Its Influence upon One Hundred Cases of Dementia Praecox Studied at the Manhattan State Hospital, State Hosp. Quart. **10**: 404-412 (May) 1925.

9. Sharp, H. C.: The Sterilization of Degenerates, pamphlet (no date, probably 1908).

away. A half-inch incision is made on the peritoneal covering of the tube, so that one tip of the blade of sharp-pointed forceps (fig. 2, II) may lift the tube out of the peritoneum, and a half-inch of it is stripped and cut away. A catgut stitch on a round needle closes the gap by three or four bites of a continuous suture, thus turning down and burying the lower end of the tube within the broad ligament (fig. 2, V). Around that part of the tube close to the cornu where the tube was crushed by the first clamp a silk ligature is tied, and the tube is tucked into the peritoneum. In several postoperative cases the wounds and scars were from $1\frac{1}{2}$ to 2 inches long, whenever tube work only was needed. At Sonoma the feeble-minded have the same advantage of a minimal incision, under Butler and Covey, with a small piece of tube removed and the ends buried after ligature.

At Los Angeles, Weaver in his private practice was found to be doing transverse incisions for the simpler abdominal procedures. At Patton, Simpson had used crushing and ligature and had had failures. Blossom ligated with tightly tied number 3 catgut, the proximal end of the cut tube being drawn deep into the broad ligament by the threaded ends of the ligature becoming sutures which were returned, respectively, front and back to close over the opened broad ligament. The distal end of the tube was brought up onto the fundus. Webster buried one end in the uterus and one in the ligament. Traver takes a wedge out of the angle of the uterus and carries his locked broad ligament stitch onto the uterus, inrolling the cornu finally with a Lembert suture.

At Norwalk, Tunnell and Rowe remove a small segment of tube, ligate both ends and bury them in the broad ligament. Etta Gray in private practice in Los Angeles uses double ligation and burial. In one state hospital the tubes, though healthy, were completely removed. Clark and Norris¹⁶ have shown how difficult it is to take the tube off without injuring the circulation in the ovary (fig. 2, upper left). As a removal of the tube does not add any security and may result in ovarian atrophy, thereby introducing the risk of flushes, depression and nerve disturbance, such removal is to be condemned.

Removal of a wedge at the horn of the uterus (fig. 2, VI, VII), with obliteration of part or all of the intramural section of the tube, was in use by Johnson at Napa, by Traver at Patton, by Doan in the Pasadena General Hospital, by Weaver at Los Angeles, and by Prof. Frank Lynch at San Francisco. It had been given up at Norwalk by Tunnell and Rowe because of the increased suturing needed to insure against bleeding. It may be said that while the cornual wedge operation is standard gynecologic practice, Nürnberg's statistics⁴ appear to show that the 6 or 7 per cent of pregnancies that follow give it no

advantage over simpler sections with buried ends. Some of the insufflations done in New York after this procedure show even more frequent failures.

In one state hospital, when simple salpingectomies were done, yards of gauze were packed into the abdominal cavity to keep the bowels back. With a proper Trendelenburg posture there is rarely excuse for a treatment of the peritoneum that fosters adhesions. In two institutions the uterus was lifted by broad bladed forceps or even by toothed clamp seizure of the fundus. This is useless handling, also fostering adhesions and

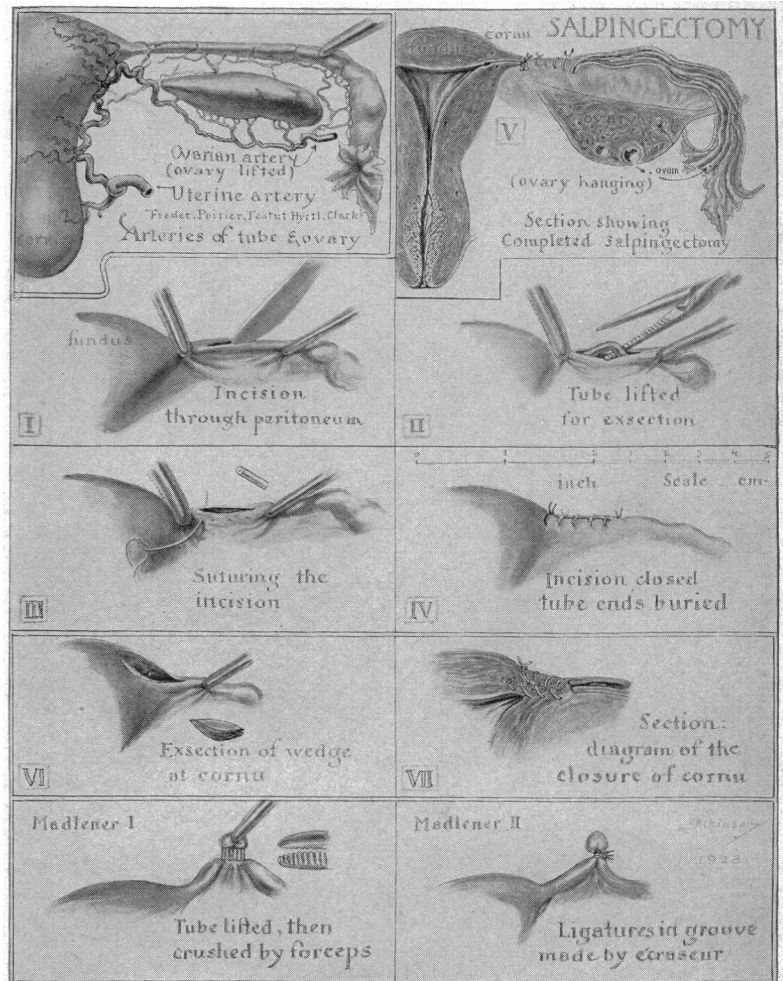


Fig. 2.—Methods of salpingectomy: The arterial circulation is shown to demonstrate that total removal of the tube may cause a menopause by cutting off the ovarian blood supply. Even puckering of the broad ligament by mass ligature may do this. As Fredet depicts some main ovarian arteries that are very small, attention is drawn to the danger of ovarian atrophy from checking the chief blood supply if one catches the uterine artery beneath the cornu with ligature or suture when ligating a tube near the cornu or when removing a wedge. Note the marked vascularity of the angle of the uterus, which explains some hemorrhages during or following the wedge operation, especially with excision by the vaginal route. I to V, steps in excision-ligature. V, diagram showing cut ends buried in the broad ligament under the peritoneum. The spindle canal in the interstitial portion is average anatomy (Guyon's thèse de Paris, 1859). The cervix is from Stieve's *Halsteil der Gebärmutter*, 1927. VI, VII, the wedge operation, shown in perspective and section. The Madlener écraseur and double ligature is the simplest and speediest of accredited methods. Walther's larger bite of the tube may jeopardize the ovarian circulation.

therefore to be condemned, since in any case the tube is to be clamped on each side (figs. 2 and 3), and such clamps offer the best means of lifting the uterus. Surgery of the peritoneal cavity should always be gentle.

The incisions after simple salpingectomies were, when healed, as I saw them, from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches in length in two hospitals and from $3\frac{1}{2}$ to 5 in the others, 5 inches being the length chosen to admit the full hand. All were vertical. I speak for a short incision as being safer against hernia and as being likely to popularize

16. Clark, J. G., and Norris, C. C.: *Conservative Surgery of the Pelvic Organs in Cases of Pelvic Peritonitis and of Uterine Myomata*, Surg. Gynec. Obst. 11: 400 (Oct.) 1910. Norris, C. C.: *Gonorrhea in Women*, p. 291.

the operation when compared with the unnecessary and conspicuous blemish of a permanent bar running from pubes to navel, and with the punctate scars of stay sutures that give the characteristic telegraph pole deformity. Indeed, salpingectomy (with or without fixation) is an ideal field for a transverse incision through skin and fascia (fig. 3) because of the simplicity of the work to be done and the security against weakness of the wall, or hernia, assured by the well known principle of the crossed or "gridiron" type of

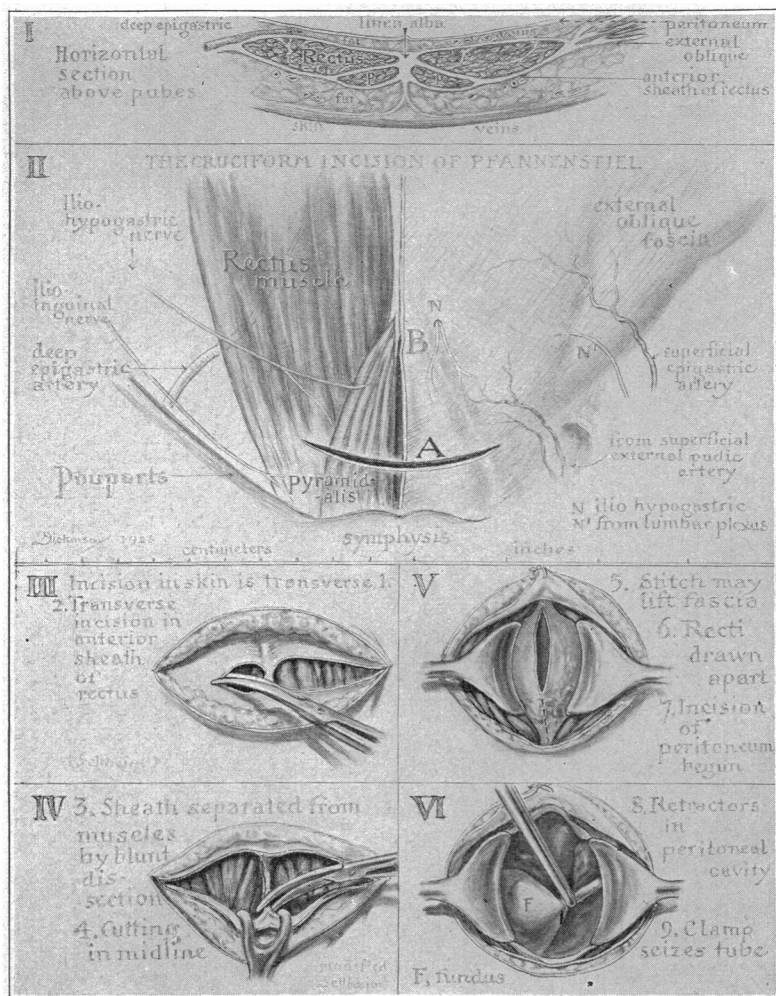


Fig. 3.—Salpingectomy with nearly invisible scar, by the gridiron incision of Pfannenstiel: Room for two fingers suffices. I and II show that the transverse incision (A) through skin and anterior sheath of rectus and the separation of the muscles (B) and the vertical incision in the peritoneum (V) avoid vessels and nerves and yield the maximum guarantee against hernia. This standard incision is particularly adapted to the minimal intra-abdominal manipulation called for in this operation.

incision. The scar disappears if located in the fold between the mons veneris and the abdomen, or if covered by the hair itself (fig. 4).

MULTIPLE OPERATIONS

The need for more surgery than mere sterilization was found at Sonoma in an average of one woman in twenty-two, the need being chiefly for appendectomy and ventral fixation of the retroverted uterus. The surgeons at Patton Hospital, in making a routine intra-abdominal search for gallstones, removed the gallbladder of one woman in twenty-two, and noted the presence of fibroids and ovarian growths in three of the last sixty patients.

TUBAL PATENCY TESTS OF STERILIZATIONS

In the California hospitals I demonstrated my simple form of insufflation, which has been in use seven years (fig. 5).¹⁷ A rubber bulb, a T connection, and the glass intra-uterine tube with a shoulder at the external os and multiple opening at the tip constitute an outfit (at a cost of only \$2.50) that can be coupled up to any blood pressure gage. The glass exhibits any clot or uncleanness within the lumen. If there is any doubt as to whether a patient has had a salpingitis and is already sterile, the air test will determine the matter, and operation may not be needed. After every sterilization operation whatever, insufflation is imperative before parole or discharge. It is made soon after or half-way between the menstrual periods, when the uterine lining is least thick.

The speculum exposes the cervix. The tube is passed until its expanded bulb closes the external os snugly (fig. 5). This snugness is clearly observed through the glass. A tenaculum to steady the cervix is needed with torn cervixes or a wide os. An assistant may auscultate over the lower part of the abdomen. The bulb is slowly compressed. In open tubes the air goes through normally at from 60 to 80 mm. of pressure; in considerably obstructed tubes the pressure ranges from 120 to 150 mm. The standard maximum test is 200 mm. It is not to be forgotten that leakage through the tube wall into the broad ligament, and emphysema, have occurred at 250 to 350 mm. A pressure of 200 mm. seems to me to put unnecessary strain on postoperative scar tissue, so I used, and asked the operators to use, from 140 to 150 mm.

As to the time after operation that should elapse before testing, judging from personal experience after my cautery stricture sterilizations, I advise waiting two months for adhesions to become firm, though six weeks is perhaps enough. The test should be repeated after the next menstrual period.

The need of testing is shown by the fact that it is a matter of surprise to leading gynecologic operators to be told that Nürnberg's studies show a pregnancy sequel of from 6 to 19 per cent.

CAUTERY STRICTURE OF THE UTERINE ENDS OF THE TUBES

Small canals lined with mucous membrane exhibit strictures so often that theoretically the bristle-sized opening of the tubes should be easily blocked, particularly as there is little of that strong driving pressure from behind which is present in the vas, the ureter or the urethra. The mucous lining of the uterus at the cornu is thin. An application to make it slough in its entire circumference (figs. 6 and 7) but in a narrow area, so that raw surfaces adhere, is an office procedure. It does not interrupt work.

Electric Cauterization.—Before sterilizing by the cautery wire (or by electrocoagulation), the shape and size of the cavity of the uterus must be defined. The uterine sound gives a very fair idea of the upper corner,

17. Dickinson, R. L.: Insufflation of Fallopian Tubes by Air and Hand Bulb, *Am. J. Obst. & Gynec.* 6: 5 (Nov.) 1923.

whether acute angled, rounded or domed. In the latter cases the vestibule of the tube is difficult or impossible to find. For such conformations, visualization, as by roentgen shadow from injected iodized oils, is needed, or else the same skill with the new hysteroscopes of Rubin¹⁸ and Gauss¹⁹ and of Mikulicz-Radecki and Freund,²⁰ as has been attained with their parent, the cystoscope. With the aid of the eye it may be possible, in the future, also to dilate the minute uterine funnel as accurately as the mouth of the ureter can be, should it be desired to reopen a cautery stricture later.

In my simplest method²¹ (1912 to date), after the length of the cavity is determined, the cautery sound is slid up against the external os so as to admit only this length (fig. 6). The possibility of pushing in farther and perforating is prevented by the sliding shoulder fixed where needed. When the cautery tip has been nestled into one upper angle of the uterus, the current is turned on for from ten to thirty seconds, according to the vascularity of the lining, a succulent uterus needing a longer application of the current. A test is made by starting to draw the sound away. It should adhere rather firmly and bring away a shriveled fragment of tissue all about it. Only in case the uterus relaxes, as it does during curetting, need one consider new sounding and renewed cauterization at this session.

The cases thus treated have been too few—about sixty-five in all—to permit the drawing of conclusions. In animals the uterus is not of comparable shape, so I abandoned my experiments, but Prudnikoff²² in 1912 (fig. 7) and Mikulicz-Radecki and Freund²⁰ in 1927 did well with electrocoagulation in animals.

Numerous preliminary tests must be made in the following way to determine the average time and the outside limits of heating: When an abdomen is opened with the purpose of cutting out the wedge from the cornu for sterilization, after the uterus is held in the hand, the tip of a cautery sound which is within the uterus is heated and a time record taken, so that one can know the number of seconds at a given heat beyond which there is danger of perforation. The cornu is then cut out and the specimen studied. Thus, without prejudice to the patient, a series of observations will standardize the cautery procedure. I have had only four such experiences. Prudnikoff's first trials preceded hysterectomies for cancer; my first, of the same year, preceded hysterectomy for fibroid (fig. 7).

Chemical Cautery Stricture.—The suggestion was advanced by Froriep²³ in 1849 that fused silver nitrate on the end of a sound be guided into place by a hollow conductor. The slough would be cast off in seven days. No case histories have been found. Since Froriep's time, several new developments have borne on his plan, such as Guyon's²⁴ casts of the cavity, roentgen shadows after iodized oil injection, insufflation, the study of caustics, and the hysteroscope. Siredey's²⁵ 15,000 cases

of cervicitis treated with quick acting potassium hydroxide and lime (Filhos' crayons) show how cervix stricture is feared, and how it occurs unless follow-up dilation is systematically carried out. This gives a clue to those who want stricture to occur, but this particular caustic may be unmanageable. Chemical stricture is likely to be the office method of the future because it is the simplest of all, though cautery stricture is easier.

REVERSIBLE OPERATIONS

There have been more than twenty-six sterilizing operations and proposals for operation on tubes and ovaries in which, by a second procedure, it is hoped to restore fertility. They emanate mostly from Germany. Naujoks²⁶ outlines them. The results are unsatisfactory, with an occasional suppuration, as from the inguinal canal.

Naujoks, reviewing temporary sterilization by means of x-rays or radium, calls it convenient, but shows that

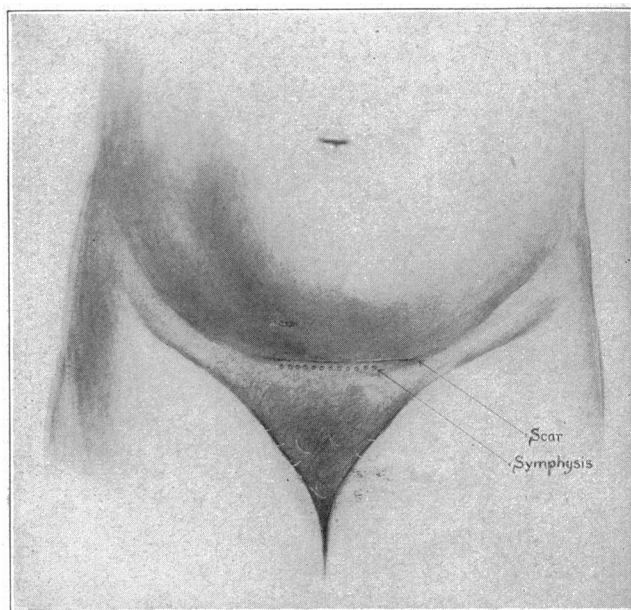


Fig. 4.—The scar, after a transverse incision, disappears in a normal skin fold.

it does not offer any certainty as to length of protection and that frequent sequelae of the same distress develop, as in the equally sudden menopause from surgical removal of the ovaries. In attempting temporary cessation of ovulation, the effect may turn out to be permanent. The effect on children born after the use of radium or x-rays falls into two classes. My collection of cases from the literature includes over fifty children born of mothers irradiated during pregnancy, with more than a third seriously defective, and half of these idiots or imbeciles. Of 196 children born of mothers after irradiation during a nonpregnant period (as for fibroids or hemorrhages), only one had grave defects, with five defective in a lesser degree from other possible causes.

CHOICE OF METHODS FOR STERILIZATION

For the Male.—In the man, selection is easy because the seminal duct is accessible, and vasectomy requires neither general anesthesia nor horizontal disability

18. Rubin, I. C.: Uterine Endoscopy with the Aid of Uterine Insufflation, *Am. J. Obst. & Gynec.* **10**: 313-327 (Sept.) 1925.

19. Gauss, C. J.: Hysteroscopic, *Arch. f. Gynäk.* **133**: 1, 1928; *Ztschr. f. Gynäk.* **17**: 1096-1128, 1928.

20. Mikulicz-Radecki and Freund: Tuben Hysteroscopic, *Arch. f. Gynäk.* **132**: 68, 1927.

21. Dickinson, R. L.: Simple Sterilization of Women by Cautery Stricture of the Intra-Uterine Tubal Openings, *Surg. Gynec. Obst.* **23**: 203 (Aug.) 1916.

22. Prudnikoff, Y. V.: Artificial Sterilization of Women by Means of Electrocoagulations. Thesis of the Imperial Academy of Medicine of St. Petersburg, 1912. Russian text.

23. Froriep, Robert: Zur Vorbeugung der Notwendigkeit des "Kaiserschnitts" und der Perforation, *Notizen aus dem Gebiete der Natur und Heilkunde* **22**: 1, 1849.

24. Guyon, J. C. F.: Sur les cavités de l'utérus à l'état de vacuité, Thèse de Paris, number 46, 1858, p. 619.

25. Guillemin, M.: Résultats du traitement des metrites cervicales catarrhales chroniques par les cauterisations intracervicales au caustique Filhos, *Bull. Soc. d'obst. et de gynec. de Paris* **13**: 321-340.

26. Naujoks, H.: Die praktische Bedeutung der zeitlich begrenzten Sterilisierung der Frau, *Fortschr. d. Med.* **44**: 133, 1926. Excellent summary for general practitioner; full bibliography.

for more than a few days, and there is no risk involved. For him there are still simpler methods of some promise:

Heat to the Testicle: Carl Moore¹¹ has shown that a rise in temperature of a few degrees arrests the manufacture of spermatozoa in several animals, ranging from the rat to the stallion. Even body heat, as with an undescended testicle, or with a testis replaced within the abdomen, stops spermatogenesis. A half hour at 116 F. (46 C.), that is, all the heat the hand can bear, suspends formation for weeks in the guinea-pig, although the unharmed supply in the reservoir, the epididymis, is deliverable for several days.

For the Female.—Salpingectomy is, or can be made, anatomically effective; but opening of the abdominal cavity is not without a small risk to life, and there are a few instances of painful adhesions, while the requirement of anesthesia, hospitalization, confinement in bed for two weeks, and abstention from heavy lifting for a couple of months is a serious handicap, except in institutional patients. Moreover, the very persons who most need sterilization, the married women with the permanent disability of incurable organic disease and mental and nervous imbalance, are bad risks for ether and for major operations. Opening the abdomen through the vagina carries a much lower risk than the attack from above and entails a shorter absence from work; but it calls for greater skill, the parts are somewhat less accessible, and oozing is sometimes hard to control. America has few experts in vaginal celiotomy as compared with the European continent.

Cautery: If the new hysteroscopes will enable the operator to see to place the chemical or electric cautery so exactly as readily to bring about a tight stricture at each narrow upper angle of the uterine cavity, and then later give him vision to puncture or stretch the scar, the procedure would be no more delicate than everyday cystoscopic treatment at the ureter opening. Even without vision, the adoption of this production of stricture is merely a matter of more extended clinical study, if my own experience is a trustworthy guide.

MORAL AND LEGAL PROBLEMS

There has been much speculation and solicitude concerning the effect on the morals of the individual and the community following discharge or parole of sterilized men and women. The California follow-up, in the main surprisingly reassuring on this matter, will be taken up in part II. The right of the state to sterilize citizens for its own good has been settled by the United States Supreme Court. This, together with an account of the actual operation of laws and the numbers sterilized in various states, will also be presented in part II, together with a consideration of the numbers involved, as indicated by the size of the feeble-minded and insane population and the cost of segregating them in institutions.³⁰

SUMMARY

A personal survey in California institutions shows proper safeguards when operations on men and women are advised in order to release them for return to work or to home supervision, and excellent surgical technic, with good results shown by the follow-up. The consideration and pictured details of various operative procedures with their surgical anatomy, as presented, argues for the simplest methods as the best. I myself favor low transverse incision. A review of the literature, including the reversible operations and nearly 400

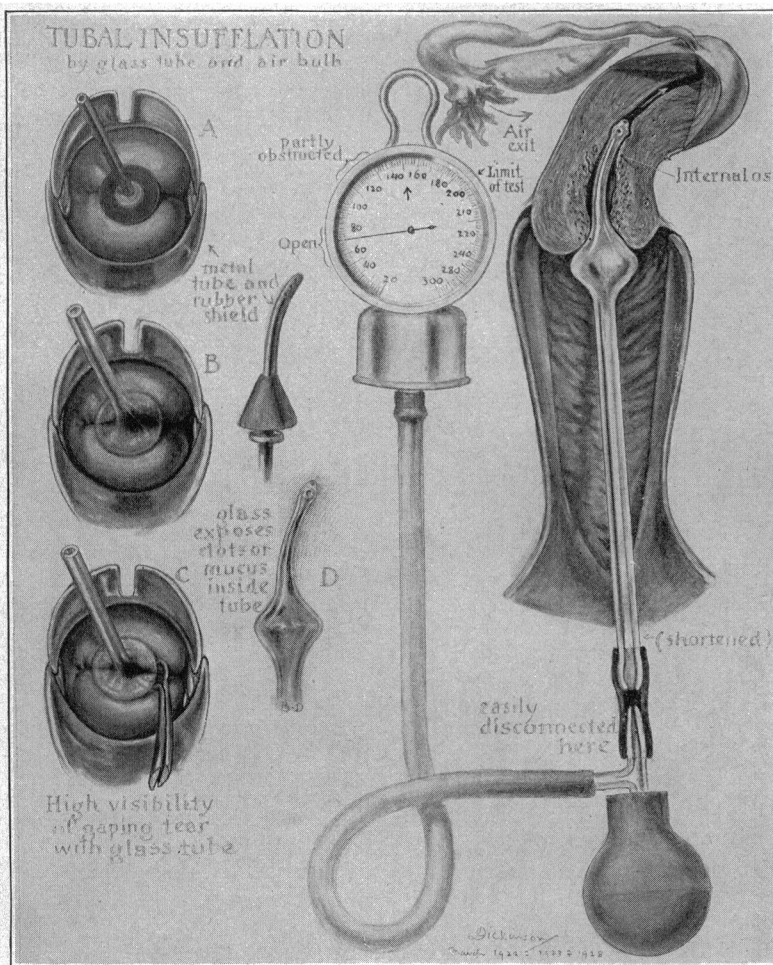


Fig. 5.—Insufflation tests to verify actual closure (or failure) after various sterilizing operations: This is done before patients are discharged or before unprotected intercourse is allowed. The simple method of the author is shown, using any blood pressure manometer. This glass tube has a large shoulder at the external os (B) and multiple openings at its tip. Like the glass catheter or hypodermic, it exhibits material within the lumen (D). The external os is not hidden, as with the metal and rubber tube (A). Forceps closure to check back-leak of air is visualized (C).

Irradiation: Unshielded roentgen operators are sterile but lose neither desire nor sensation, and they return to fertility when exposure ceases.

On these two kinds of sterilization—temporary and permanent—research is needed; as it is also on implantation of the cut tube into the epididymis to restore fertility, because the claim of 50 per cent success²⁹ has hardly been substantiated. It looks as if 25 per cent of success were nearer actuality, judging not by mere semen in a specimen, but by children born at or near term.

29. Hagner (footnote 14).

30. Motion passed at the Minneapolis meeting, June 14, 1928: "Resolved, That the Section on Obstetrics, Gynecology and Abdominal Surgery recommend to the American Medical Association that it organize or take part in an impartial and thorough investigation of sterilization from the point of view of medicine, surgery and preventive medicine."

"rejuvenations," brings up the discussion of nonhospital methods, such as heat to the testis, irradiation of the male or female gonad, and intra-uterine cautery stricture, chemical or electrical, visualized by the hysteroscope. Stress is laid on testing results by searching for spermatozoa in the semen and by insufflating the uterine tubes.

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ABSTRACT OF DISCUSSION

DR. O. L. NORSWORTHY, Houston, Texas: The subject of feeble-mindedness and crime, their causes, care and prevention, has become one of world-wide interest. The International Rotary organization, which is to convene in Minneapolis next week, will have this question brought before it. Especially will the needs for prevention of delinquency through inheritance be discussed before the International Rotary organization. Even the commercial world is becoming educated to sterilization of the unfit, and after a few years' education through such splendid organizations as the Rotary clubs, and other clubs, our law makers, as well as our general population, will become convinced that selected breeding in man is just as important as in animals. As Dr. Dickinson says, sterilization, not castration, should be done. The public must be made to realize the difference. Sterilization does not cause castration, nor does it unsex either sex. The operation of sterilization is not dangerous to health or life. It is a minor operation and should be classed as such.

To read an account of some of the noted cases of feeble-mindedness in which an alarming number (as high as 1,200) of the offspring were feeble-minded, criminals, drunkards or moral perverts should convince any doubting mind of the need of some rigid

the study of contraceptive measures. Dr. Dickinson referred to lay organizations studying the question. There is an organization called the Eugenic Society, which also is a lay organization. The initial studies in the subject of temporary contraceptive measures and permanent sterilization have been undertaken by organizations made up of lay groups and have not been officially undertaken by the medical groups. I want to express my great appreciation of Dr. Dickinson's efforts in attempting to interest this body in officially adopting investigation along these particular lines, because they are, after all, fundamentally medical problems and should be entirely under the control and direction of official medical bodies. While we of the lay groups have been entirely medical in our particular investigations and the investigations have been under the personal control of physicians, yet the organization, the enthusiasm and the direction have had to come from lay groups. We hope that the day will soon come when we as lay organizations will be able to lay down our burdens which will be taken up by the larger and more proficient groups of organized medicine along these lines.

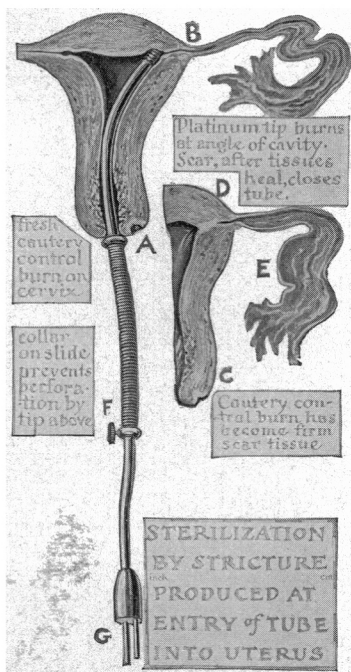


Fig. 6.—Office method of sterilization through electric cautery burn at cornu (B). The slough is followed by stricture. When the control scar on the cervix (C) has become rigid, the interior scar (D) should stand insufflation.

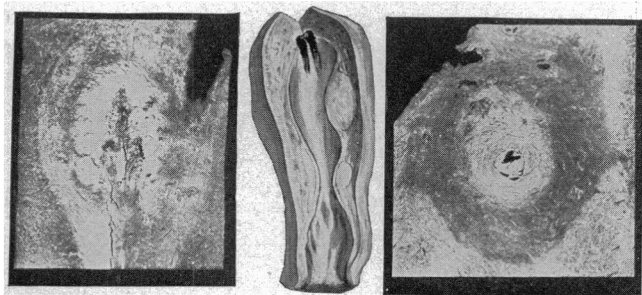


Fig. 7.—Demonstrations of cautery burns in uteri requiring removal. The center one immediately preceded hysterectomy for fibroids, and was done with a platinum nasal tip by Dickinson. The two sections by Prudenkoff, at the sides, are from cancer operations two days after electrocoagulation. All three were in the year 1912.

restrictions to prevent the population of our jails, feeble-minded colonies, and insane institutions equaling that of our schools for higher education.

DR. JAMES F. COOPER, New York: I happen to be connected with an organization, a lay group, that is undertaking