

cedure; but with the exercise of ordinary skill, prudence, and cleanliness, the risks are so remote and so improbable that they need not be seriously considered in estimating correctly the great, palpable, and immediate advantages pertaining to this accepted and indispensable therapeutic resource.  
*James B. Baird.*

**HYPODERMOCLYSIS.**—There are few therapeutic procedures which have sprung into such well-deserved popularity as hypodermoclysis. So frequently is it employed to meet urgent surgical and medical conditions that it is difficult for us to realize that less than ten years ago it was an almost unknown method of treatment. While it had been employed sporadically, so to speak, by a number of continental investigators at various times, and very occasionally by a few American physicians and surgeons, it was not until Hildebrand, of San Francisco, published a paper upon this matter that it received the attention that it deserved. Soon after the appearance of Hildebrand's paper, the writer of this article, having become much interested not only in the employment of hypodermoclysis but in the question of the most suitable fluids for use in conditions in which hypodermoclysis was indicated, carried out a series of clinical experiments which confirmed him in his belief that we had in hypodermoclysis a ready means of supplying the body with fluid and in flushing the kidneys, thereby aiding the excretion of effete materials by these organs, and also aiding in the elimination of them through the skin.

Clinical applications of intravenous injection and hypodermoclysis side by side have, it seems, convinced the profession that for most cases hypodermoclysis is much the more useful method, and that only in very urgent cases with peculiar conditions present is it to be substituted by intravenous transfusion. In the majority of instances in which hemorrhage requires the speedy injection of normal saline fluid, it is found that the employment of hypodermoclysis is equal to the occasion and that absorption from the subcutaneous tissues takes place with sufficient rapidity to supply the blood-vessels with a proper amount of fluid. It is only when the hemorrhage is very profuse and the condition is most urgent that intravenous injection can be employed as a satisfactory measure in its place.

The conditions in which hypodermoclysis can be resorted to most satisfactorily are hemorrhages, as just mentioned; in cases of uræmia not associated with dropsy; in certain cases of pneumonia in which the infectious aspect of the case is most marked, and the action of the kidneys is imperfect; and in all of the acute infectious diseases in which it is impossible for the patient to take enough liquid by the stomach to supply his tissues and eliminating organs with a sufficient quantity of fluid. Hypodermoclysis can also be satisfactorily employed in cases of gastric ulcer, and after abdominal operations, when it is necessary to provide the body with fluid and yet in which it is impossible for fluid to be taken by the ordinary channels. Used in this way in cases of obstinate vomiting, saline infusions will very frequently relieve much suffering, allay thirst, maintain urinary flow, and in every way tend to support the patient through a trying ordeal.

Another very useful employment of saline infusions by the hypodermic method is its use in the treatment of threatened collapse in cholera infantum, in cholera morbus of a severe type, and particularly in Asiatic cholera. In the latter disease its employment has undoubtedly saved life in many instances; the saline infusion taking the place of the fluids which are purged out of the body, and diluting the toxins of the disease which are then more readily eliminated by the kidneys. Still another instance in which hypodermoclysis may be employed with great advantage is in the treatment of severe burns, not only for the purpose of overcoming shock, but, more important, for the relief of the toxæmia which seems to be the true cause of death in many cases of this character.

In regard to the employment of hypodermoclysis in the treatment of surgical shock or that which follows severe

injuries, it is important to bear in mind that the condition of the patient is one in which there is a complete relaxation of the vaso-motor system. Or, in other words, he who is suffering from shock is being bled to death into his own blood-vessels. Under these circumstances the administration of fluids, either by hypodermoclysis or even by intravenous injection, is of no value so far as their bulk is concerned, unless in association with them are administered drugs which will overcome the vascular relaxation and tend to restore normal arterial tension. Many physicians ignore the well-known physiological fact that the vascular system is capable, when completely dilated, of holding many times the quantity of blood contained in the body. This fact is emphasized when we remember that at an autopsy we are wont to find practically all the blood in the body in the great veins of the thorax and abdomen. When it is recalled that not only are these great veins capable of holding all the blood which the body contains, but that the capillaries of the skin, the capillaries of the muscles, and the capillary systems of large glands, as the liver, are capable of holding immense quantities of blood when relaxed, it will readily be seen that an enormous quantity of liquid would have to be placed in the patient's body before this liquid could by its presence actually fill the widely dilated blood paths. And even if it were possible to fill the blood-vessels of the body by the profuse administration of normal salt solution, this would be of no advantage to the patient, since, under these circumstances, his heart would not be able to pump so much of a bulk of fluid and his tissues would be practically drowned. When, therefore, the use of normal salt solution by hypodermoclysis is followed by good results in the treatment of shock, it is to be clearly understood that these good results accrue not so much by the presence of an additional quantity of fluid in the blood-vessels as upon the stimulant effect which the injection may have directly or reflexly upon arterial tension and cardiac activity, and the therapeutic point is to emphasize that it is wise, under these circumstances, to employ a normal salt solution which is not absolutely indifferent, but one which really possesses some slight stimulant power over the cardio-vascular apparatus.

Another important point to be remembered in the use of hypodermoclysis is that it is not safe to infuse a greater quantity of liquid than one drachm to each pound of body weight in each fifteen minutes; as, if this amount is exceeded, the accumulation of the liquid in the system is so great that the tissues become drowned because the kidneys cannot excrete the liquid fast enough. Hypodermoclysis is also contraindicated in œdema of the lungs due to either cardiac or renal disease, in cases of chronic bronchitis with excessive secretion of mucus and fluid. In stout old persons, and in young children in particular, it must be used with great caution, if at all, and the same remark applies to parenchymatous nephritis, because the tissues are usually dropsical in this affection; and even if they are not, there is a tendency to œdema of the lungs and an imperfect eliminative action of the kidneys so that fluids rapidly accumulate in the tissues. It is hardly necessary to add that in patients having a high arterial tension hypodermoclysis is also contraindicated unless perchance uræmia or puerperal eclampsia is present, under which circumstances arterial tension should be reduced by bleeding or, in the case of puerperal eclampsia, by the administration of full doses of veratrum viride, since by this means arterial pressure is reduced and an active secretion on the part of the skin aids the kidneys in eliminating both fluid and materials from the patient's body.

Physiological experiments made by many investigators, and particularly by Dr. Sydney Ringer, of London, and Dr. Locke, of Harvard University, have proved that a most useful combination is the one which follows, and, at the suggestion of the writer, large manufacturing chemists have put this formula upon the market dissolved in one ounce (31 gm.) of sterile water in such strength that when this quantity of concentrated solution is added to a quart (litre) of pure water, it forms a nor-

mal physiological salt solution. The writer has employed this concentrated saline, after diluting it, in a great many cases with the most satisfactory results, and believes that it is the best solution for the purposes named. The formula is as follows:—R Calcium chloride, 0.25 gm.; potassium chloride, 0.1 gm.; sodium chloride, 9 gm.; water, 31 gm. This, when added to a quart (litre) of pure water, constitutes what is known as "normal saline solution."

The proper means of introducing normal saline solution under the skin is to employ an ordinary clean glass irrigating apparatus and rubber tube. In the distal end of the rubber tube is inserted, and if necessary tied in, a needle having a calibre about that of the ordinary antitoxin needle. The reservoir is filled with normal saline solution and hung about eighteen inches or two feet above the level at which the needle is inserted. The salt solution should be at about 110° F. in the reservoir, since it cools rapidly in its slow passage through the tube. Or, better still, it may be placed in a warm reservoir at the temperature of 100°, and the rubber tube may be coiled in a basin of water at the same temperature so that the fluid in it is maintained at the temperature of 100° during its flow. The skin where the needle is to be inserted should be thoroughly cleansed before the puncture is made, and the most satisfactory site for the injection is a little above the groin, about half-way between the navel and the anterior superior spine, or, in stout persons and in women, in the submammary region, and sometimes it may be employed on the inner side of the thighs, care being taken to avoid the great vessels. If even moderate antiseptic precautions are maintained abscess practically never results, and the operation is quite painless, although some tenderness may exist in the region of the injection for a few hours after the absorption of the fluid. The process is not a painful one at any stage. When it is wise to inject a considerable quantity of liquid into the patient at once, more than one needle and tube may be employed simultaneously.  
*Hobart Amory Hare.*

**HYPOGLOSSAL NERVE.**—(Synonyms: Nervus motorius lingue; Nervus hypoglossus; Par nonum of Willis and the older writers; Par duodecimum; *Nerv hypoglossus* (Fr.); *Zungenfleischnerf* (Ger.).)

The twelfth or hypoglossal nerve, whose name is derived from the Greek *ὑπο*, beneath, and *γλῶσσα*, the tongue, is the motor nerve of the muscles of the tongue and of those of the hyoid bone, with the exception of the digastric, stylo-hyoid, mylo-hyoid, and the superior constrictor of the pharynx. It also supplies the sterno-thyroid muscle. According to the old nomenclature it was termed the *ninth* nerve.

For the anatomy of the hypoglossal nerve consult the article on *Cranial Nerves*.

**PHYSIOLOGY.**—The hypoglossal nerve is the motor nerve for the muscles of the tongue, the sterno-thyroid muscle, and all those attached to the hyoid bone, with the exception of those mentioned above. Through its connection with the upper cervical ganglion of the sympathetic, vaso-motor fibres for the muscles of the tongue pass into it. From the gangliform plexus of the vagus and its lesser lingual branch are derived its fibres of muscular sensation. Whether any such come from the cervical nerves or through the anastomosis with the lingual is still doubtful, though Lewin says: "Recurrent fibres run from the linguæ to the hypoglossus, and these in part ascend as far as the anterior condyloid foramen, in part descend in the ramus descendens." As a rule, no influence reaches the tongue through the ansa hypoglossi, and, on the other hand, little effect is produced on the muscles supplied by the ramus descendens (the sterno-thyroid, omo-hyoid, and sterno-hyoid) by irritation of the roots of the hypoglossus.

**PATHOLOGY.**—Injury or disease of the hypoglossal nerve or its nucleus produces either spasm or paralysis of the muscles which it supplies.

(a) *Spasm of the Muscles Supplied by the Hypoglossal Nerve; Lingual Spasm.*—This is rarely idiopathic and is

very infrequent as an independent affection. On the other hand, it occurs not uncommonly in certain affections of the brain, and more rarely in some of those of the spinal cord. In all forms of general convulsions, in eclampsia, epilepsy, chorea, and hysteria, we meet with it frequently, and it is often seen in company with spasms of the muscles supplied by the motor branch of the fifth nerve, and by the facial and spinal accessory nerves. At times it accompanies facial neuralgia, or is coincident with stuttering. It is not rare in bilateral athetosis, and it occurs in trismus. It may also be dependent on a definite pathological condition of the brain or its membranes, and is found in meningitis and in certain forms of cerebral and bulbar paralysis. It sometimes occurs in certain diseases of the spinal cord, as progressive muscular atrophy, in which the disease probably extends upward and involves the hypoglossal nucleus.

In many of these cases we may suppose some injury of the nucleus, or, possibly, of the nerve itself, but we must not forget that lingual spasm may in all probability be produced by lesion of the cortical motor centre of the tongue at the base of the ascending frontal convolution, or possibly of some of the fibres which connect this with the hypoglossal nucleus. The spasm is also at times apparently due to peripheral or reflex causes, as in some cases in which it occurs with tic douloureux or in company with the spasms of neighboring muscles. In one case it was apparently caused by caries of the teeth, which had produced an ulceration of the gums.

The spasms vary in character in different cases. They may be either tonic or clonic. They may consist in mere protrusion of the tongue. Sometimes the tongue is thrust violently forward against the teeth, or it may be protruded and rapidly retracted, as in Berger's case, in which this occurred as often as fifty or sixty times a minute. Sometimes the tongue seems to be simply rolled round in the mouth. Again, the movements may be very varied and irregular. These spasms may also affect the sterno-thyroid, sterno-hyoid, and thyro-hyoid muscles. There is usually no pain or swelling, but the spasms may be preceded by a sensation of numbness in the tongue, or discomfort and oppression about the throat above the larynx. The tongue sometimes feels too big for the mouth. The spasms are for the most part independent of the acts of speaking, masticating, and swallowing, neither affecting them, unless when at their height, nor being affected by them. In certain cases, however, the spasms are induced or greatly aggravated by such acts.

The tonic spasms likewise may either occur independently, or they may be induced by voluntary efforts to move the tongue. Those of the latter class have been divided into articulatory and masticatory spasms, according as they were produced more especially by attempts to move the tongue in speech or in eating. These articulatory spasms are known as articulatory hypoglossal cramp or apthongia (apthongie, Fleury), from the Greek, a privative, and *φθγγός*, the voice. In some cases the tongue is glued to the hard palate whenever the patient attempts to speak; in others (masticatory cramp) the food is ejected from the mouth by the involuntary action of the tongue during mastication. In Ganghofner's case, in which there was spasmodic contraction of the tongue in ordinary speech, singing, rapid speech, and the declamation of previously known pieces were more easily accomplished.

The prognosis of independent lingual spasm is generally good, though the disease may be obstinate and persistent.

**Treatment.** There is no symptomatic treatment, as such, for lingual spasm except the application of electricity. The constant current may be applied directly to the tongue or to the hypoglossal nerve in the neck. The faradic may also be used in the same manner. These are the most useful means of direct treatment. When the spasm occurs as a symptom, or in the course of some other disease, the primary disease is, of course, to be

treated. In independent spasm our first care should be to remove, as far as possible, all predisposing or exciting causes. The teeth and gums should be carefully examined, and any source of reflex irritation should be allayed. Means should also be taken to improve the general health, and to strengthen the resisting powers of the nervous system. Thus fresh air, good wholesome diet, change of scene, and general tonics and sedatives—quinine, iron, and bromide of potassium or sodium—should be our principal aids.

(b) *Paralysis of the Muscles of the Tongue; Glossoplegia.*—Section of the hypoglossus in dogs, when bilateral, causes total paralysis of the tongue. The animals cannot drink, and are apt to bite the tongue, which hangs loosely out of the mouth (Landois).

In man paralysis of the muscles of the tongue is usually central. It may be produced by lesions of the cortical motor centre of the tongue, or of the fibres which connect it with the hypoglossal nucleus, or by lesions of the nucleus itself or of the hypoglossal nerve. Hence it is found in cases of cerebral or bulbar hemorrhage or softening, and in certain other forms of cerebral disease, in progressive bulbar paralysis, and in those forms of spinal disease in which the ganglion cells of the hypoglossal nuclei are affected. Thus it is sometimes seen in the advanced stage of tabes dorsalis and in descending secondary sclerosis. The hypoglossal nerve itself may be affected either intracranially, as by the pressure of tumors at the base of the brain, or extracranially, either at its exit from the cranium or in the neck. This may be done by injuries of the upper cervical vertebrae, such as fracture of the atlas, or by tumors or wounds of the neck, by aneurism of the vertebral artery, or by carious or syphilitic processes.

*Symptoms.* Hypoglossal paralysis may be either unilateral or bilateral, according as one or both nerves are involved, though bilateral paralysis may be caused by a unilateral cortical lesion. In unilateral paralysis the tongue, when protruded, deviates to the affected side. This is due to the unbalanced action of the healthy genioglossus muscle, which in contracting not only throws the tip of the tongue forward, but directs it at the same time to the opposite side. In bilateral paralysis the tongue cannot be protruded, but lies perfectly motionless in the mouth. It is relaxed, anæmic, often atrophied, and deeply furrowed. Not infrequently there are fibrillary twitchings. In unilateral paralysis these symptoms may appear on the affected side of the tongue. "When the tongue is paralyzed it falls backward in the cavity of the mouth as the patient lies on his back, and the glottis becomes partially or wholly closed by it. Paralysis of the tongue thus contributes to the production of stertorous breathing in cases of apoplexy, and may even cause asphyxia, when the paralysis is bilateral and more or less complete." Thus closure of the glottis may be produced in deep narcosis.

In lingual paralysis the speech is much affected, and the power of articulation greatly impaired. In bilateral paralysis, with atrophy, the speech is said to be completely inarticulate and unintelligible, and even when the paralysis is slight, the singing of high notes and falsetto is impaired. Ross states that difficulty is first experienced in pronouncing the letters, s, sh, l, e, i, and at a later period k, g, r, etc.

Mastication is interfered with also to a certain extent, as the tongue cannot direct the food nor compress it against the teeth. Deglutition is likewise affected by the falling backward of the tongue, and also because the food cannot be properly collected on its dorsum and pushed back into the pharynx. Hence regurgitation into the mouth occurs. The salivation of the affected side, which is a prominent symptom in certain cases of lingual paralysis, has not yet been shown to be due to anything more than reflex action. The slight diminution in the tactile sensibility of the affected side, sometimes noticed, seems in certain cases not to exist.

*Diagnosis.* This is usually very easy. Hutchinson's method of testing the condition of the lingualis muscle is

very simple. He holds it between his thumb and finger and bids the patient protrude the tongue. If either side be paralyzed, the muscle of that side will be flaccid and relaxed, and will not harden like the healthy one on contraction.

The prognosis is naturally dependent on the cause. *Treatment.* This must, of course, be directed against the primary cause. Locally, the galvanic or faradic current may be applied either to the tongue itself or to the nerve in the neck. *William N. Bullard.*

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**HYPOPHOSPHITES.**—I. GENERAL MEDICINAL PROPERTIES OF THE HYPOPHOSPHITES.—Physiologically, salts of hypophosphorous acid are simply bland saline representatives of their respective bases, and produce no special effect whatsoever, due to the hypophosphorous acid of their composition. What place they hold in medicine has been from theoretical considerations purely. The idea has been that because these salts contain phosphorus in a comparatively low state of oxidation, they will affect the system after the manner of phosphorus itself, and, especially, will yield phosphorus in such chemical combination as to be assimilable for the nutrition of nerve tissues. Clinical experience, however, has failed on the one hand to get the expected results, while on the other it has shown that nearly all of a dose of a hypophosphite, swallowed, reappears in the urine unchanged. Those who prescribe these salts, do so in cases of neuralgia and of nerve exhaustion or malnutrition generally, and in phthisis.

With the exception of the potassium salt the hypophosphites are harmless, and they are, with manufacturing pharmacologists, favorite ingredients of emulsions of cod-liver oil.

II. THE HYPOPHOSPHITES USED IN MEDICINE.—The hypophosphites official in the United States Pharmacopœia are the iron, potassium, sodium, and calcium salts. Ferric hypophosphite will be found treated of under *Iron*.

*Potassium Hypophosphite, KH<sub>2</sub>PO<sub>3</sub>.* The salt is official in the United States Pharmacopœia as *Potassii Hypophosphitis*, Potassium Hypophosphite. It occurs in "white, opaque, hexagonal plates, or crystalline masses, or a granular powder, odorless, and having a pungent, saline taste; very deliquescent. Soluble at 15° C. (59° F.) in 0.6 part of water, and in 7.3 parts of alcohol; in 0.3 part of boiling water, and in 3.6 parts of boiling alcohol; insoluble in ether" (U. S. P.). If triturated or heated with an oxidizing agent, such as a nitrate, the mixture will explode. Because of deliquescence, the salt must be kept in well-stoppered bottles.

Potassium hypophosphite follows the rule of potassic salts of being irritant in large concentrated dosage, but in therapeutic doses it is locally bland enough. Again, because a potassic salt, it may tend to induce retrograde metamorphosis of lowly organized material, and hence lead to softening of cheesy deposits in the lungs. This particular hypophosphite is therefore, theoretically at least, not without a possible dangerous tendency in phthisis. The salt is administered in solution, aqueous or syrupy, in doses of from 0.65 to 2 gm. (gr. x.-xxx.) three times a day. A convenient form of giving it is in the official *syrup of hypophosphites* (see *postea*).

*Sodium Hypophosphite, NaH<sub>2</sub>PO<sub>3</sub>·H<sub>2</sub>O.* The salt is official in the United States Pharmacopœia as *Sodii Hypophosphitis*, Sodium Hypophosphite. It occurs in "small, colorless, transparent, rectangular plates of a pearly lustre, or a white granular powder, odorless, and having a bitterish sweet, saline taste. Very deliquescent on exposure to moist air. Soluble at 15° C. (59° F.) in 1 part of water, and in 30 parts of alcohol; in 0.12 part of boiling water, and in 1 part of boiling alcohol; slightly soluble in absolute alcohol, insoluble in ether" (U. S. P.). Like the potassium salt, this also will explode on trituration

and with an oxidizing agent, and must be kept in well-stoppered bottles.

This sodic salt is a generally serviceable and permissible hypophosphite, having, as usual with compounds of sodium, no active individuality due to the basic radical. It may be given in the same manner and dosage as the potassic salt.

*Calcium Hypophosphite, CaH<sub>2</sub>(PO<sub>3</sub>)<sub>2</sub>.* The salt is official in the United States Pharmacopœia as *Calcii Hypophosphitis*, Calcium Hypophosphite. It occurs as "colorless, transparent, monoclinic prisms, or small, lustrous scales, or a white, crystalline powder, odorless, having a nauseous, bitter taste, and permanent in the air. Soluble at 15° C. (59° F.) in 6.8 parts of water, and in 6 parts of boiling water; insoluble in alcohol" (U. S. P.).

Being a salt of lime, which salt is assumed to have a reconstituent tendency in phthisical conditions, this hypophosphite is theoretically the one to be preferred for administration in consumption. It is also the one best borne when the stomach or bowels are irritable, as so often happens in the disease mentioned. The salt is given in the same manner and dose as the potassic salt.

The following pharmaceutical preparations of the hypophosphites are official in the United States Pharmacopœia; *Syrupus Hypophosphitum*, Syrup of Hypophosphites. This is an aqueous solution of potassic, sodic, and calcic hypophosphites (wherein the latter salt has been made fully to dissolve by the addition of a little hypophosphorous acid), made into a syrup by the addition of sugar, and flavored with spirit of lemon. By weight the preparation contains fifty per cent. of sugar, and, of the hypophosphites, 4.5 per cent. of the calcic salt, and 1.5 per cent. each of the potassic and sodic. By measure 4 c.c. (fl. ʒi.) contains about 0.18 gm. (gr. iij.) of the calcic hypophosphite, and 0.06 gm. (gr. i.) each of the potassic and sodic salts. This syrup forms a convenient preparation for prescription, and may be ordered in doses of from one to two or three teaspoonfuls, several times a day. *Syrupus Hypophosphitum cum Ferro*, Syrup of Hypophosphites with Iron. This preparation is simply the foregoing syrup charged with one per cent. each of lactate of iron and potassium citrate—this particular iron salt being selected for pharmaceutical reasons only. This syrup forms a convenient combination of hypophosphites with a chalybeate, and may be given, where such combination is indicated, in doses the same as those of the simple syrup. *Edward Curtis.*

**HYSSOP.**—See *Labiatae*.

**HYSSOP, HEDGE.**—See *Scrophulariaceae*.

**HYSTERECTOMY** (from *ἰστέρα*, the womb, *ék* out, and *τέμνειν*, to cut) is the removal of the uterus by a cutting operation and may be accomplished through an incision in the abdominal wall (celio-hysterectomy), by way of the vagina (kolpo-hysterectomy), or by a combination of both methods.

Celio-hysterectomy includes (a) supravaginal amputation and (b) the complete removal. Kolpo-hysterectomy at the present time practically always means the complete removal of the organ.

While dim records of the operation are found as early as 100 A.D., when Soranos<sup>1</sup> is said to have removed the uterus per vaginam, yet as late as 1882, when Ahlfeld<sup>2</sup> collected the records of sixty-six cases in which the uterus had been removed through the abdomen with only thirteen recoveries, the recorded cases were very few and the mortality was frightful, ranging from eighty to ninety per cent. In its present form, and with its very low mortality of from three to five per cent. when done for the same indications, the operation is essentially a modern one, and as such has been developed during the last fifteen years, and largely in America by Baer, Goffe, and Kelly. With the improved technique and lessened mortality the range of indications for its performance has widened, until now it may include:

*For the Abdominal Operation.*—All solid or cystic tumors

of the uterus; cancer; uterine rupture during labor; certain conditions of puerperal sepsis; pregnancy complicated by pelvic deformity, cancer, or other serious obstacle to the passage of the child; uterine prolapse or inversion; and incidentally as a step in the removal of complicated suppurative conditions of the uterine appendages.

*For the Vaginal Operation.*—Bilateral suppurative conditions of the appendages; prolapse; cancer; pregnancy with cancer before the sixth month; certain septic conditions of the uterus; certain rare conditions which may require the ablation of a small movable uterus.

*For the Combined Operation.*—Cancer, certain complicated fibroids; failure to secure hæmorrhage from below.

For the details of these indications the reader is referred to the articles treating of the various conditions mentioned.

The operation of hysterectomy is always formidable, and as conditions may arise at any time which tax the resources and nerve of the most skilled, and where hesitation or lack of expedient may mean the immediate death of the patient, it should not be undertaken without an adequate practical knowledge both of aseptic surgical technique as applied to abdominal surgery and of the anatomy of the pelvic contents, particularly of the relations of the bladder, ureters, rectum, uterine and ovarian arteries, and large venous trunks.

**TECHNIQUE OF CELIO-HYSTERECTOMY.**—The patient is prepared as for any abdominal operation; the intestines are thoroughly emptied; for several days she is encouraged to drink water freely; the skin of the abdomen is carefully disinfected; the vulva and vagina are cleansed and packed with 1 to 4,000 bichloride gauze for two days, and the limbs covered with cotton and a bandage to prevent chilling of the surface.

The instruments needed are: Two scalpels, two pairs of strong blunt-pointed scissors, two anatomical forceps, six traction forceps, twelve short hæmostatic forceps, eight long clamp forceps, pedicle needle, retractors, long and small curved needles, strong silk or kangaroo tendon, slightly chromicized catgut nos. 1, 2, 3.

The patient is put in the Trendelenburg position. The abdomen is opened by a median incision beginning half an inch above the pubes and extending upward, as far as may be necessary to allow the delivery of the tumor. In making this incision care must be taken not to injure the bladder which sometimes is drawn high up. Remembering that any injury to the capsule of fibroids will cause free and troublesome bleeding, adhesions are carefully detached, slight ones being wiped free by a bit of gauze and firmer ones divided between two ligatures. Dense adhesions to intestine may require that small areas be detached from the surface of the tumor. The tumor being freed from adhesions is lifted up and out of the abdominal cavity. Large flat gauze pads with strings attached are wrung out of hot sterile salt solution and placed so as to protect and cover the intestines. The finger is passed under the broad ligament on the more accessible side, and, guided by it, the pedicle needle, threaded with a long, strong ligature, is passed through a portion free from veins, so as to include the ovarian artery. This ligature is then firmly tied and occludes the artery and the adjacent large venous trunks. The ovary is to be left outside the ligature, unless it is so diseased that its removal is desirable. A second bite with the same ligature ties off the round ligament. A long clamp is now placed so as to control the vessels on the uterine side and the tissues between clamp and ligatures are divided with the scissors. If the ovarian artery on the other side is easily accessible, it is tied in the same way. Careful inspection of the anterior surface of the uterus will now determine the upper limit of the bladder, and a transverse incision through peritoneum only is made a third of an inch above this point, running from the lower edge of the cut in the broad ligament across the uterus to a corresponding point on the other side. The bladder is freed from the uterus by being carefully wiped down with a piece of gauze held by fingers or forceps. The uterine artery is now exposed, and a finger passed