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by Charles Conrad Miller**

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*** START OF THE PROJECT GUTENBERG EBOOK THE CURE OF RUPTURE BY PARAFFIN INJECTIONS ***

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The Cure of Rupture

BY

Paraffin Injections

BY

CHARLES C. MILLER, M. D.

*Comprising a description of a method of treatment destined
to occupy an important place as a cure for rupture
owing to the extreme simplicity of the technic
and its advantages from an economic
standpoint*

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In taking up the description of the injection of paraffin for the cure of hernia a number of remarks of a prefatory nature are called for, as it is necessary to justify a treatment which has come in for a considerable censure from surgeons who have had no experience with the method and who have judged solely from a few mishaps which came to their attention and which in no way permit of an accurate estimate of the treatment.

Paraffin injections have been in use only a few years. When first introduced their value for the closing of hernial openings was mentioned. At the time the factors which made injections valuable for such treatment were not appreciated. Paraffin was merely looked upon as an agent which might be used to plug a hernial opening and such plugging of a hernial opening is impracticable without histologic changes in the tissues to cause permanent closure of the hernial passage.

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The need which Paraffin fulfills in Hernia.

Paraffin has a tendency to promote the formation of connective tissue and in hernial cases there is invariably a state of the parts which will be benefitted by the throwing out of connective tissue in the neighborhood of the deficiency which gives passage to the hernial contents. Besides this production of connective tissue, the occlusion of the hernial sac and glueing together of the walls of the hernial canal, the plugging and supportive action of a material like paraffin is likely to be in a measure useful as the paraffin does not lie in the tissues as a single mass, but it is traversed by trabeculae of connective tissue.

Injections of paraffin are accomplished with such ease without anesthesia that the mere fact that a hernia is curable without the taking of an anesthetic is an advantage on the part of the paraffin method which will be highly appreciated by a very large percentage of patients suffering from rupture.

It is safe to say that for every patient suffering from rupture who is willing to submit to the cutting operation four or five patients will be met who are afraid to submit to such operation because a general anesthetic is to be taken.

Applicable in the Physician's Office.

Paraffin injections may be made in the physician's office and there is no condition produced which renders it difficult for the patient after injection to go to his home, if he must not travel more than a moderate distance. The reaction may be such as to make it advisable for the patient to remain quiet for a week or even two weeks, though this is exceptional, yet such avoidance of exertion is not looked upon in the same light by patients as two weeks strict confinement to bed.

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The probability of escaping confinement is a great incentive to a patient to submit to an injection, when he would refuse operation.

Injections are not necessarily unphysiologic as the sufferer from a hernia has a physiologic deficiency which the paraffin accurately fills with normal connective tissue.

The dangers of injection can be eliminated. The technic is not difficult even when all precautions are taken.

There is less likelihood of suppuration following the injection treatment than following the cutting operation.

The consequences of suppuration are less. If suppuration occur after the open operation failure is likely, not to mention the danger of peritonitis. Such is not the case following injection, and while consequences are less serious suppuration is avoided much more readily than following the open operation.

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Only the operator thoroughly acquainted with the manner of disposition of paraffin should attempt the injection of hernia.

Simplicity.

To the skilled operator the injection treatment is exceedingly simple and the injection method must always be far more simple than the open operation can ever become.

A hernia can be injected without haste in from two to four minutes.

An assistant is of no use.

The open operation cannot be performed without the aid of several trained assistants, and without elaborate and expensive preparations, it is not feasible as anything but a hospital operation.

Hospital surgeons may be expected to condemn the injection treatment of hernia, as it will open to thousands of the profession a field which has hitherto been monopolized by the surgeons with hospital facilities.

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Experimental injections before human injections.

Before injecting a hernia the operator should be thoroughly acquainted with the manner of diffusion of paraffin in the tissues. This experience can be gained by the making of numerous injections into the carcass of a small animal and the subsequent careful dissection of the animal. A dead cat, dog, rabbit, or chicken may be used for experimental injections and many such injections should be made.

Hyperinjection of a hernial canal should be religiously avoided.

Should the operation fail and the patient suffer from the presence of the paraffin it can be removed by surgical means and at the same time the open operation performed.

The presence of the paraffin will not interfere with the successful performance of the open operation nor will it complicate the operation so that the chances of a radical cure are not diminished from this method, nor is the patient liable to a slower convalescence.

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Vehement protests against the use of paraffin injections are to be expected from surgeons doing the open operation, and unbiased readers should not be misled by condemnatory remarks from inexperienced sources.

The hair over the pubes and the groin of the affected side should be cut rather close and then the parts scrubbed with a solution of green soap. A small amount of a forty per cent. solution of formaldehyde may be added to the soap solution as this agent is a very powerful antiseptic.

Soap solution.

Formaldehyde solution, one dram (40%).

Green soap, four ounces.

Dilute alcohol to make one pint.

The dilute alcohol is made up of equal parts of ninety-five per cent alcohol and water.

After the parts are thoroughly scrubbed with this solution the soap should be removed with moist compresses and then the parts mopped with a solution of seventy per cent alcohol. Finally the field of operation should be flooded with ether as this agent is an effective antiseptic and also acts as a solvent for any greasy matter not removed by the soap.

Antiseptics cannot be as freely used upon the hands of the operator as upon the skin of the patient as the repeated application of the stronger antiseptics cause a scaling of the epithelial cells and finally the development of an irritated state which prevents cleansing of the hands sufficiently to permit operating.

It is well to scrub the hands with the soap solution and then to follow with the use of the seventy per cent alcohol. The alcohol solution is the least irritating of effective antiseptics and it is the solution in which needles and leather washers should be kept, so that they are at all times ready for use.

The sterilized paraffin syringe should not be handled until the hands have been scrubbed. The washers and needles, just before using, should be removed from the alcohol solution. It is unnecessary to wash the alcohol from the fingers, washers or needles, in fact, it is preferable to leave it upon them.

Using an extra large syringe it is possible to operate upon several patients without re-sterilizing the syringe. This instrument may be soaked in the alcohol solution, the needle changed and the operator may continue until the syringe is empty.

Even though one have a syringe capable of holding enough for several operations it is well to have a second at hand ready for use as the instruments sometimes break or spring a leak when least expected. Never use a syringe which leaks, as one cannot tell how much is going into the tissues and how much is escaping. Leaks invariably occur at the side of the needle base or at the point of juncture of the barrel of the instrument with its anterior portion. Paraffin in the solid state will seldom if ever escape along the side of the plunger within the barrel of the instrument when the all metal paraffin syringe is used and the all metal syringe is the only instrument which should be used for paraffin injections.

The screw piston is preferable to the sliding piston under all circumstances as it gives the operator a better control over the injection. Injections are made with the paraffin compounds cold so that considerable pressure must be brought to bear to cause the harder mixtures to flow through a long needle.

The plunger should be removed from the syringe and the instrument in two parts should be thoroughly boiled before filling. It should be scrubbed with soap and water if dirty or corroded before it is dropped into the boiling water. After boiling for a half hour the barrel of the syringe which is closed anteriorly, except for the needle opening, is held up and the melted paraffin poured in until the instrument is quite full, then the plunger is fitted in and pressed down until it is possible to assemble the instrument ready for use.

Needles should be boiled. Leather washers when not in use should be kept in solutions of alcohol.

Preparations for operation, such as sterilizing syringe and needles should be done hours before operation. If the sterilized loaded syringe is placed in a sterile towel it may be kept for days and then before use to insure sterilization it should be soaked in a seventy per cent solution of alcohol. If a needle is attached to the syringe when it is thrown in the alcohol solution it will be found that the paraffin in the syringe will not be affected by the alcohol. The instrument may be used from the alcohol without even drying it.

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Before inserting the needle for the injection of the paraffin start its flow and observe that the paraffin is escaping from the needle in a perfectly smooth string.

The same words as to preparation apply when the white vaseline is used. This agent should always be sterilized by heat before placing it in the syringe and when syringe and vaseline are sterile the exterior of the instrument may be re-sterilized at the time of using by alcohol soaking.

Paraffin in the liquid state may be drawn from a large container directly into the syringe when the needle has been removed. The needle may then be screwed in place and the instrument held with the point of the needle directly upward and pressure made upon the piston until all air escapes and the liquid paraffin begins to flow. Then the instrument may be allowed to cool and its contents to consolidate.

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Material injected at room temperature.

All these injections are made with the material in the syringe at room temperature. The syringe may be left filled for days and not heated at all when the injections are finally made. In mid-winter if the syringe has been kept in a cold room its temperature may be so low that it may be advisable to warm it somewhat, but at an average temperature of seventy degrees Fahrenheit the mixture first described should flow freely through an ordinary hypodermic needle.

Some operators have said a good deal about the paraffin and the proper place to secure it. As nearly as can be learned the compounds used in this country are products of the Standard Oil Company. The paraffin used in the formulae of this book has an average melting point of 130.

For reducing the melting point of the paraffin mix the paraffin with the white vaseline of the Chesborough company. If an agent is sold in a tin stamped white vaseline it should have the name on the tin of the Chesborough company as this is the only firm having the right to use this name. Petrolatum albi or white petrolatum is a few cents cheaper than the vaseline but the difference is of so small an amount that it is better to use the vaseline rather than packages which may vary more than the Chesborough product.

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FORMULA NUMBER ONE.

White vaseline, one-half pound.

Paraffin, one-half pound.

Melt together.

This should be sterilized by having the mixture stand in a covered container in a vessel of water which is also covered and the water should be kept boiling for a half hour.

Containers for sterilized compounds.

With the paraffin may be boiled a number of test tubes. These after boiling one-half hour may be lifted from the boiling water with forceps. As they will be quite hot if they are held with opening downward the water will drain from them and their own heat will evaporate the few drops in the interior and they will be left dry. Into each test tube sufficient paraffin may be poured to fill a syringe and then they should be plugged with sterile cotton or corks which have been boiled. The test tubes containing the paraffin mixture may then be put away and when taken out at a later time for filling the syringe the paraffin may be melted by heat and poured into the sterile syringe or the paraffin may be boiled by holding the test tube over a Bunsen burner, or other heater. When paraffin boils the temperature of the boiling mixture is higher than that of boiling water but the boiling causes dense black smoke to be given off and this is objectionable in a closed room. Repeated boiling of paraffin causes it to discolor but this does not occur when the vessel containing the paraffin is placed in a water bath and the water around the paraffin container boiled. No smoking of the paraffin occurs when it is heated in a water bath and this means of sterilization is the most satisfactory though the first time the paraffin is sterilized it should be kept in the boiling water for a half hour.

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A softer mixture of paraffin, which may be used when in fear of the effects of the injection of the harder mixture, is made as follows:

FORMULA NUMBER TWO.

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Paraffin, two ounces.

White vaseline, eight ounces.

Melt together and sterilize.

This second paraffin compound is advisable when the operator is anxious to secure a plugging action with a mixture which will always be fairly soft, and which is less likely to be absorbed than plain sterilized white vaseline.

Vaseline.

The third compound is the sterilized white vaseline. It is probable that this agent is frequently absorbed in a comparatively short time but it has the valuable property of diffusing freely through the tissues so that it produces a more extensive reaction and when it is used in connection with the harder mixtures the operator may be more certain of securing an occlusive inflammation of the sac of the hernia and the more extensive production of connective tissues so that the parts separated to make way for the passage of the hernial sac are more certainly bound together.

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None of these mixtures are hard. If a portion of the mixture first described is secured under the arm for a half hour or held in the mouth for that length of time and it is raised to body temperature it will be found that it is comparatively soft. It is not a liquid and it is not likely to be absorbed, yet it is not a hard waxy mass.

The great danger of the untrained operator is to inject too much at one point and should the operator do this and get it in the canal it will make a lump at one point and press unnecessarily upon the tissues and in time will be displaced and will drag involved tissues with it, producing discomfort by the distortion.

The patient for injection should be placed upon the back. When the thigh is slightly flexed the wall of the abdomen is relaxed and should the external ring be not dilated by the protrusion of a large hernia the relaxation obtained by the flexing of the thigh and allowing the flexed leg to rest against the other will relax and dilate the external ring somewhat so that it may facilitate the free passage of the needle and it will also permit of the more free moving of the point of the needle in the loose cellular tissues as the needle is gradually withdrawn.

Pelvis high and head low.

If the head is dropped low and the pelvis is high, a position easily possible with some surgical chairs, the veins of the cord are depleted and the likelihood of opening or entering a vein is diminished. This posture should only be used where there is a well marked varicocele and the suction method of inserting the needle should always be used. When the veins are dilated the elevation and their depletion may prevent the operator making several efforts to pass the needle without striking them, a thing which is easily possible in the presence of a canal full of dilated vessels.

Should there be a well marked varicocele the blunted needle should be used so that it will not be possible to cut a vein by the moving of the needle and at the same time the operator should move the point of the needle slowly from side to side as it is withdrawn.

SKIN INFILTRATION TO PERMIT OF INSERTION OF LONG NEEDLE WITHOUT UNDUE PAIN.

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It may be well to infiltrate the skin slightly at the site of the puncturing of the skin with the larger needle. To do this a weak cocain or alypin solution should be used. This solution is made by the addition of the cocain or alypin tablets to one or two drams of boiled water.

A tablet containing six tenths of a grain of alypin or cocain is sufficient for a dram solution. A few drops of this injected over the external ring will permit of the passage of the needle through the tough skin without pain. The pressing of the needle along the roof of the canal is not usually sufficiently painful to call for much complaint from the patient.

If the patients are nervous a preliminary injection of a one per cent solution of cocain or alypin into the inguinal canal is not contraindicated. To accomplish this the larger needle should be screwed upon the infiltrating syringe and as the needle is pressed into the canal the solution is slowly forced in front of the needle point. If sufficient solution is thrown ahead of the needle the passage of the needle along the inguinal canal is entirely painless.

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The infiltration of skin or canal being complete the needle must be withdrawn and the syringe emptied and the plunger pressed down so that the empty syringe is attached to the needle through which the paraffin injection is to be made when the operator has assured himself that the needle has been passed as far as desired without traversing or puncturing a vein.

No matter what precautions are taken, paraffin deposited in the tissues causes an increased flow of blood to the parts. The reaction is in the nature of a distinct active hyperemic state and it is sufficient to cause the proliferation of connective tissue. Even if pure white vaseline alone is injected there will be such connective tissue proliferation and if the paraffin is deposited close along the peritoneal surfaces of the sac sufficient of a circulatory disturbance will be produced to result in the sticking together of the serous surfaces of the sac and such sticking together of the walls will mean an elimination of the patency of the sac, one of the essential features of a radical cure.

The paraffin compound number one is of such consistency that it is unlikely to be absorbed and properly placed with discretion it will favor the retention of the hernia by acting as a plug. This plugging action is not likely to be successful if the paraffin is simply thrown in as a mass, as it will be displaced, and when displaced it will make undue traction upon parts with which it is intimately connected so that should the paraffin be thrown in in the form of an irregular mass closing only a small part of the canal and such displacement occur the patient may suffer considerable discomfort.

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The corking action of the paraffin is not to be disregarded, yet at the same time it must be remembered that the injection must be so diffused that the supporting mass has quite a universal support from all the tissues from the internal ring clear out to the external ring.

It must also be remembered that the paraffin thrown into the tissues causes a thickening of the tissues and should the canal be filled with paraffin with the thickening which so rapidly develops the canal will be unduly crowded.

If the canal is plugged up tightly and marked pressure is made upon the nerves of the cord at one point it is likely that discomfort will be produced which will last for some time.

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Object of operator.

The object of the operator is to secure a diffusion of the injection through the loose cellular tissues by the directing of the needle in all directions as it is withdrawn. This diffusion is facilitated by the nature of the paraffin. It is not to be forgotten that the vaseline diffuses very readily and extensively and if the operator is fearful of overinjecting the parts it is best to use it in excess rather than the harder mixture.

If the needle is simply withdrawn the paraffin is not thrown into the canal in a regular pencil-like plug but it lumps irregularly with small diverticula projecting from each irregular mass.

The free moving of the needle point in all directions as the needle is withdrawn favors the diffusion and avoids the unsatisfactory lumping of the injection.

Within twelve hours after the operation the tissues are almost certain to become quite sensitive to pressure. The reaction may be followed by considerable pressure pain for a day or two. Should the patient not be comfortable while at rest, that is sitting about or lying down; then something should be given to relieve the pain. Codeine is the most satisfactory agent for preventing the patient from feeling pain during the most acute stage of the reaction. Codeine does not put the patient to sleep as does morphine, nor does codeine constipate or make the skin itch. Codeine is only about one-third or one-fourth as toxic as morphine and consequently it may be given in a proportionately larger dose. It may be given in tablet form or in solution by the mouth. The best way to administer it is in doses of one-half grain every hour while the patient is suffering actual pain. Tell the patient that it will relieve him of unpleasant symptoms during the reaction and that it is undesirable that he should suffer from the reaction. In this way the patient will be kept quite comfortable during the time that the reaction is sufficient to cause pain. It is impossible to tell whether the reaction will be such as to cause any pain or not. In case it does not develop no internal treatment is necessary. Other agents may be used to relieve pain, though none offer the advantages of codeine without disadvantages. It is not advisable to let these patients suffer from a severe reaction. It is better to meet the first indications of pain with the free administration of codeine. The patient should not know the nature of the drug, and as it produces none of the peculiar effects of morphine it is not really a drug at all dangerous from the habit forming standpoint.

Local applications of heat or cold may be used if the reaction is well marked.

THE PRECAUTION USED TO PREVENT THROWING OF PARAFFIN INTO THE CIRCULATION.

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In all cases precautions should be taken to avoid throwing of the paraffin mixture directly into the circulation. This is accomplished by passing the needle slowly into the tissues which are to be injected and while the needle is passing through the tissues it should have a strong vacuum suction upon it so that should it strike a vein the blood will immediately begin to flow into the needle. To illustrate how easily blood may be sucked from a vein a hypodermic with a glass barrel may be taken armed with a small needle. If the arm of a patient be allowed to hang down the veins will distend and the point of the needle may be slipped through the skin and into the vein. If the vein is punctured by the needle point the instant the piston of the syringe is drawn back a vacuum forms in the syringe and the blood will flow into the syringe. This same method is to be used in the passage of the larger paraffin needle or any paraffin needle only as the needle is passed along its course the suction should be constantly exerted. This constant suction is secured by simply attaching the half glass syringe to the needle and then as soon as the point of the needle is under the skin the piston is withdrawn and a vacuum formed. Then holding the piston of the syringe out, maintaining the vacuum, the needle is pushed slowly in as far as the operator desires to inject. Should blood begin to flow into the needle at any point the onward passage of the needle is stopped and is withdrawn and re-inserted in a somewhat different direction, particularly if during the withdrawal a point is found where the blood flows steadily into the syringe.

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If at no point blood flows into the syringe it is plain that no vessel of dangerous size has been punctured by the needle. The veins of the cord are found rather closely around the cord and the cord usually lies below and behind the sac so that should the operator aim to carry his needle point along rather high in the canal he will be least likely to encounter these vessels. It is not to be forgotten that the veins of the cord are particularly likely to be somewhat dilated in these cases of hernia and the operator is taking more or less of a hazard in neglecting the suction technic outlined. It is not safe to trust to the fact that the paraffin is injected in a solid state as is asserted by some operators. It is true that paraffin in a liquid state is more likely to flow into an opened vein than the paraffin in the solid state, yet it is possible to throw a very small amount of solid paraffin into a vein if no precaution is taken to prevent it, and while a very small mass thrown directly into a vein would be harmless in nearly all instances it might do considerable damage should it be so unfortunate as to lodge in certain vessels.

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The inguinal canal gives passage to the spermatic cord. It is an oblique canal extending from a point one-half an inch above the center of Poupart's ligament to the spine of the pubes. The cord emerging from the external ring continues into the scrotum, and the most definite manner of finding the external ring is by picking up the cord in the scrotum and following it with the index finger until the point of the index finger is pressed into the canal, the scrotum being invaginated at the same time. In scrotal hernia when the patient is placed in the recumbent posture the contents of the hernial sac may be pressed into the abdomen and the finger following the receding hernial contents will slip into the opening of the external ring.

A hernia should always be completely reduced before any operation is attempted and the size and situation of the external ring definitely determined. The larger and the longer a hernia has been allowed to go unreduced the shorter the inguinal canal will be, as the inner margin of the internal ring is gradually forced toward the median line of the body, and in very large hernia the external ring is stretched somewhat outward so that an opening exists directly through the abdominal wall. This character of hernia is such that three fingers may easily be pressed directly into the hernial interval and as a rule so much of the abdominal contents have been outside the abdomen for so long that the hernia cannot be overcome without decidedly increasing abdominal pressure. These cases in which hernial contents can be pressed into the abdomen by force and which markedly increase the intra-abdominal pressure when reduced are unsuited for any operative treatment which does not include excision of a quantity of omentum.

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The average case.

In the average case the examination of the external ring will not show a canal so greatly dilated and it may be taken for granted that it has not been shortened to a considerable extent by the giving of the internal margin of the internal ring toward the median line. Under these circumstances the operator may decide that he has a canal of from two to three inches in length and lying parallel to Poupart's ligament and slightly above this structure.

The sac of the hernia usually lies above and in front of the cord.

Running closely connected with the cord are the veins which go to make up the pampiniform plexus. These veins being close to the cord and the cord itself quite susceptible to pressure it is advisable to pass the needle along near the roof of the inguinal canal and to attain this end it is well to locate definitely the external ring and to have a distinct knowledge of the exact situation of the upper margin of the ring.

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Considerable cellular tissue is found in the inguinal canal so that in passing the needle through the canal should it meet with considerable resistance it has no doubt missed the canal and entered some of the more resistant tissues making up its walls.

The cellular tissue in the canal is to receive the injection of the operator and it will be his object to facilitate the diffusion of the various materials injected so that an extensive formation of connective tissue will be promoted. The plug action of the injection is not alone to be considered for the operator is then likely to throw too much into the canal and with the development of the connective tissue the canal is unduly crowded.

The ill consequences of hyperinjection should not be forgotten. It is the error to which the beginner is most liable.

Some operators have been content to insert a needle over the approximate site of the internal ring and then to force it downward until it lies as close to the internal ring as they can approximate and then to throw in a mass of paraffin sufficient to occlude the canal at this point.

If the needle is inserted about half an inch above the middle of Poupart's ligament it will be over the site of the normal internal ring. After the needle passes through the subcutaneous fat it will be felt to strike the firm fibrinous layers of the external wall of the inguinal canal. After the needle has passed through this firm layer it will enter the loose cellular tissue in the neighborhood of the internal ring. If the injection is diffused over an area of an inch or an inch and a half in circumference the internal ring is likely to be plugged for the time by the injection.

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The larger Hernia.

Should the hernia be large the injection should be made closer to the pubes, but injection at the internal ring is not sufficient, the canal should also be injected with a certain amount of the paraffin and vaseline.

The canal may be injected by passing the needle directly through the outer wall of the inguinal canal, remembering its course about one-half inch above the line of Poupart's ligament.

The most satisfactory plan of injecting where the operator can successfully follow the technic is to find the external ring and then insert the needle directly into the external ring close to its upper margin and to carry the needle along for at least two inches. The suction technic should be followed and the needle should be moved in all directions as it is withdrawn and the deposit diffused as much as possible.

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About the external ring itself and directly between the pillars of the external ring a certain amount of the injection should be placed.

THE AMOUNT OF PARAFFIN TO BE INTRODUCED IN A GIVEN CASE.

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The tendency is to overinject a case. One must not forget that the tissues will probably thicken to twice the size of the mass injected. The operator must estimate as nearly as possible the size of the tract to be filled and then aim to throw in enough to about half fill it. The diffusion of the paraffin will usually safely hold the hernia when the patient rises from the table.

Should the operator throw in mixtures one and two until the parts are fairly distended and the hernia be not held it is better to use only the plain sterile vaseline for a subsequent injection at the site of the internal ring. If a half dram of vaseline at this point does not hold the hernia a small amount of vaseline may then be thrown in the central portion of the canal.

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At first the vaseline injections should be used whenever in doubt as to the amount needed above a certain point. As the operator becomes acquainted with the needs of cases by experience the vaseline can be largely substituted by the paraffin mixture number one.

Have a syringe loaded with paraffin mixture number one and another loaded with sterile vaseline. See that the paraffin flows smoothly from the syringe without leaks. See also that the vaseline syringe is working smoothly.

Have needles intended for injection of paraffin free from this agent. Place patient on back, thighs flexed slightly or straight if the external ring is easily accessible. Follow the spermatic cord and locate definitely the external ring.

Attach empty syringe to needle. Pass needle point through skin. As soon as needle point is through skin exhaust syringe. That is draw piston out to form vacuum in syringe and obtain suction. Pass the needle slowly through external ring and along close to the roof of inguinal canal.

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When needle is in full length, if no vein has been struck and blood aspirated into the syringe, detach syringe and screw the paraffin syringe tightly to needle.

Inject a few drops of paraffin by screwing down syringe. As paraffin is flowing move the point of the needle about in the loose cellular tissue and continuing the injection slowly withdraw the needle. Continue moving the point of the needle in all directions as the needle is withdrawn so that the paraffin will be diffused as much as possible. As the point of the needle emerges between the pillars of the external ring discontinue the injection.

Test the effectiveness of the injection.

Allow patient to stand on feet. If the hernia reappears have the patient lie down again and reinsert the needle as before described and inject sterile vaseline rather than the paraffin mixture.

Not more than enough paraffin to half fill the canal should be injected. If such quantity does not hold hernia sterile vaseline should be used discreetly until hernia is held.

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The surgeon must estimate the approximate size of the inguinal canal by the size of the external ring.

If a vein is struck the needle should be withdrawn and the syringe emptied of blood; then the needle should be reinserted, using the syringe for suction. If a vein is struck a second time it will be well to insert the needle through the abdominal wall at the site of the internal ring and if no vein is struck at this point an injection may be made. If this holds the hernia it may be well to make no injection of canal for two weeks. During the interval even if the hernia does not recur it will be well for patient to wear web bandage truss or a spica bandage with a pad pressure over the inguinal canal. At the end of two weeks inject canal moderately with paraffin or vaseline to promote formation of connective tissue.

If the injection of the canal at the site of the internal ring does not hold the hernia, reduce the same and make a puncture with a small needle through the external wall of the canal just above the external ring. If no vein is struck inject moderately and see if such injection holds hernia. In such a case place pad of moderate size over the canal and put on firm spica and have the patient stay off of feet as much as possible for ten days or two weeks. In this case the permanence of the cure will depend upon the amount of connective tissue formed.

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Injection at Internal ring.

To inject through the abdominal wall at the internal ring select a point midway between the anterior superior spine of the ilium and the pubes and one-half an inch above the line of Poupart's ligament. This represents the site of the internal ring. The needle should be pressed through the fibrous wall of the canal at this point and should be directed towards the pubes. If the hernia is at all large remember that the canal is shortened and select a point one-half or three-quarters of an inch nearer the pubes as the site of the ring. When through the outer wall of the inguinal canal the needle point will have a considerable freedom in the loose cellular tissue and the injection should be diffused in a circle of an inch or an inch and a half in diameter. Before taking off the suction syringe after the passage of the needle sweep the point slowly in a circle to make sure that no vein has been opened or is likely to be opened as the needle is swept about.

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The hypodermic needle for injection.

A hypodermic needle may be used for an internal ring injection or an injection through the anterior wall of the canal, but in moving it about the operator should watch carefully and not break such needle. If a needle breaks it will be at the shoulder formed by the point of attachment of the shaft of the needle with the butt.

The advantage of the small hypodermic needle is that it may be passed with very little discomfort to the patient and it throws a finer string of paraffin and favors diffusion of the agent.

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A hypodermic needle is lacking in length to inject the canal when passed through the external

ring along the canal.

Should the surgeon attempt injection along the canal and find the patient too nervous or the technic too difficult the hypodermic may be used and an injection made through the anterior wall of the canal at the internal ring, at about the center of the canal and about one-half an inch from the external ring.

The hypodermic needle injections are simple and should be accomplished even on a very nervous patient without troubling to infiltrate with cocain or alypin.

BE DISCREET IF INJECTION IS PAINFUL.

Should a patient complain that the injection is painful inject very discreetly or better check the injection there, move the point of the needle and again try slowly. If the cold injection causes pain try at another point. Put in a drop or two and should the patient still complain discontinue and put on a spica or truss for a few days. Observe the reaction and then if it is not severe inject again.

Remember that several injections may be made upon a patient but hyperinjection, that is the injection of too much, will cause no little distress and that it is impossible to remove all the paraffin mixture or the vaseline without an open operation, if they are not absorbed.

Needle punctures should be sealed with collodion. No other dressings are required.

Begin codeine early and use freely when a painful reaction develops.

THE INJECTION OF FEMORAL HERNIA.

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The femoral ring is below Poupart's ligament. When the femoral hernia protrudes through the crural canal it is directed upward over Poupart's ligament. To reduce it press the mass toward the feet of the patient and then upward toward the abdominal cavity. The saphenous opening may then be felt. On the outer side of the opening is the large vein of the thigh. The needle should be inserted at the inner extremity of the opening, that is toward the median line. Aspirating of blood may mean the puncture of this large vein and it may not be advisable to inject carelessly when this vein has been wounded owing to its size. The crural canal is only about a half inch in length. The injection of it may be accomplished with a hypodermic needle. It is not well to sweep the point of the needle externally with too great freedom as the vein may be wounded. Inject slowly and move the point of the syringe carefully so that the injection may be diffused in the canal.

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INJECTION OF UMBILICAL HERNIA.

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Reduce the hernia and examine the margins of the hernial ring with care so as to be thoroughly acquainted with the character and situation of these margins. Remember that the tissues are often very thin and that an injection in the center of the hernia may simply go through the peritoneum and thus be placed directly in the abdomen. Injections of paraffin into the peritoneal cavity of animals have not proven to be dangerous, the agent not causing irritation of the surface of the peritoneum when sterile.

Umbilical hernia may be injected with a hypodermic needle building out from the margins of the hernial opening, but it is well not to inject with too great freedom. After diffusing the tissues of the canal or ring a pad and binder should be applied and the patient given two weeks interval to see if sufficient of the connective tissue has developed to close the canal. If the hernia is not overcome and recurs injections may be repeated.

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Case Reports

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Case 1.

Case 1 A. G.—Italian child, age twenty-eight months, female. (Ass. Civ. Char. Disp.) Umbilical hernia protruding about one-half inch and with an opening which may be filled by tip of index finger.

Parts thoroughly sterilized, hernia reduced and contents held in abdominal cavity by pressure of index finger of assistant. The margins of ring and the skin covering hernial opening injected with paraffin of melting point 108. In effort to avoid puncturing of hernial sac and throwing paraffin into the peritoneal cavity the skin of sac injected with the paraffin. About half dram amount used. Operation Jan. 17, 1905. Jan. 18, 1905. Temp. normal. Parts sensitive. Cries and struggles when parts touched. May 13, 1905. Last examination. Skin somewhat red. Paraffin mass easily palpable. Skin red but not sensitive.

Case 2 A. C. C.—Disp. W. P. Swedish boy, age 2 years and 9 months. Injected Feb. 3, 1905. Hernia as large as walnut. Reduced. Finger of assistant holding in contents. Injection made into tissue surrounding the hernial opening with view of crowding margins together. Half dram injected. Child crying forced contents into sac. Reduced and injection under skin of sac and around margins of opening to plug. Nearly dram paraffin used, melting point 108.

Parts moderately sensitive at end of week. No redness though paraffin mass palpable close under skin and intimately connected with it. April 11, 1905. Last examination. No redness, no tenderness, no recurrence.

Case 3 T. F.—Teamster. Irish parentage. Age 20. A. C. C. Disp. Bubonoccele, left side. First noted four weeks previously. Operation May 14, 1905. Area sterilized. Small area of skin infiltrated with a one percent solution of cocain. Paraffin melting point 108, injected over area of prominence of bubonoccele and into upper portion of canal. Two punctures made a dram and a half of paraffin injected. Parts sensitive for three days so that patient walked without bending thigh at hip joint. No temperature. Local applications. Codeine given in quarter grain doses every two hours. Fourth day parts much less sensitive, can bend leg freely in sitting or walking. Area prominent from swelling but no impulse. Examination June 25, 1905. No pain, no tenderness, no impulse, prominence in region of internal ring slightly greater than on opposite side.

Case 4 A. P.—Sicilian. Worker in shoe factory. Age 24. Hernia four months duration. Never retained by truss. Sac extends half way to bottom of scrotum. Pubes shaved, skin sterilized. Operation Aug. 26, 1905. Skin infiltrated to allow passage of large needle without pain. Injection at internal ring of forty minims. Injections into canal of about thirty minims. In attempting to inject paraffin in cold state screw piston syringe broken. All metal syringe used for infiltrating, warmed and filled with melted paraffin. In using syringe to inject the canal near the external ring the needle plugged. Using all force possible the plug forced from needle and over a dram of melted paraffin thrown between the pillars of the external ring. Patient complained of considerable pain. Codeine used one-fourth grain every hour. On the third day after injection skin over the external ring infiltrated and with sharp spoon about a half dram of paraffin removed. Operation painless. Formaldehyde solutions one to five thousand used as moist dressings. Codeine continued for two days longer. Patient lost one week from work. Sept. 24, 1905. No recurrence, no pain or tenderness. Area at former site of hernia slightly more prominent than opposite side, no redness of skin.

Case 5.

Case 5 F. C.—American born, age 18. Private patient. Hernia about size of average marble midway between ensiform cartilage and umbilicus. Spontaneous origin. Injected at office with half dram of paraffin, melting point 115. Operation Dec. 2, 1905. About half dram total quantity used. No reaction when adhesive strip removed on fourth day. Slightly tender on pressure. Examination Feb. 7, 1906. No recurrence, no redness, no pain.

Case 6 J. C.—Italian barber. A. C. C. Disp. Inguinal hernia on right side. Noted three weeks before. Sac protruding through external ring. Injection after infiltration. Forty minims injected about internal ring. Twenty minims in canal. Twelve or fifteen minims thrown between the pillars of external ring. Codeine prescribed but not taken. Parts quite sensitive on third day. No fever. Sleeps well with two pillows under thigh of affected side. Fifth day, no pain, tenderness very much less, able to bend leg almost as freely as ever. Twelfth day impulse at internal ring? (Questionable.) Injection of twenty minims at internal ring, ten into canal and ten between pillars, melting point 104. March 4, 1906. Last examination. No recurrence, no pain or tenderness.

Case 7 A. Y.—Femoral hernia. Female, age 35, A. C. C. Disp. Worker in tailor shop. History of case indefinite as to length of time present. Never been treated in any way. Operation March 21, 1906. Injection of forty minims of paraffin through saphenous opening and about ten minims through Poupart's ligament. Codeine discontinued at end of fourth night. Tenderness slight. No recurrence at end of twenty days. Patient not seen subsequently.

Case 8 E. H.—Marshalltown, Iowa. Private patient. American born. Varicocele on left side and oblique inguinal hernia. Operation April 16, 1906. Infiltration and removal of dilated veins in scrotum. Wound closed and inguinal canal followed by large needle. No blood aspirated and cold paraffin mixture with melting point 115 injected along canal. About forty minims thrown along canal and then puncture made at site of internal ring and half dram diffused at this point.

Personal communication one year later making final payment for operation. Patient cured and grateful.

Case 9—Italian section worker wearing spring truss for holding of inguinal hernia. Strong pressure of truss making marked depression at site of internal ring. Patient injected with dram and half of paraffin of melting point 115. May 20, 1906. Agent deposited along canal and at internal ring. One week later no pain, no tenderness to moderate pressure. Cord somewhat larger than normal and epididimus thickened but not tender. Shreds in urine. Through interpreter information gleaned that epididimus had been somewhat tender following operation. History of acute epididimitis some months before.

Case 10 A. J.—Patient first consulted at Harvey dispensary. Treated for urethral stricture by internal urethrotomy. Subsequently referred to A. C. C. Disp. for treatment. Developed acute appendicitis and operation for removal after development of abscess. Abscess drained and healing of abdominal incision imperfect leaving hernial protrusion internally and near superior angle of scar. Injected with seventy minims of paraffin, 115 melting point, on Aug. 2, 1906. No pain following injection, no discoloration, and no recurrence over a year and a half after operation.

These cases represent the ten first which were seen subsequent to injection. Cases which were injected and which did not return subsequent to injection have not been included as they would be of no value in estimating as to the usefulness of this method. In no instance has an ill consequence been suffered which would cause the patient to seek surgical aid elsewhere, or at least no case has come to the knowledge of the author directly or indirectly.

Large hernia which have gone unreduced for years have not been treated by injection and discretion demands that for some time, or until injection treatments have been practiced upon many patients, that large ruptures which have been outside the abdomen for long periods be left to the surgeon or be injected only by practitioners capable of doing the cutting operation in the advent of the failure of the injection treatment.

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The author for his own part has felt no hesitancy in injecting cases which promised a fair degree of success, realizing full well that untoward symptoms of a local character may be overcome by free dissection, removal of the paraffin and restoration of the inguinal canal by the usual surgical means.

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Added missing period at [end of chapter](#).

The last twelve pages of the original book were misnumbered, page 59 identified as 69, through page 70 identified as 80. The entry for Case reports was adjusted from 69 to 59 in the Table of Contents. In printed versions of this e-book, the corrected page numbers will appear.

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