The Optimum Treatment for Undescended Testis*

JOHN K. LATTIMER, M.D., Sc.D.

Professor and Chairman, Department of Urology, College of Physicians and Surgeons of Columbia University, New York, New York

Our specialty, urology, is a great combination of medicine and surgery. In addition, it involves endocrinology, psychiatry, geriatrics and pediatrics. We interrogate our residents and resident candidates very closely as to why they go into urology. The most important point that they express over and over again is that urology is not just surgery but a combination of medicine and surgery. They also emphasize the quality of the diagnostic techniques which we use. Usually, when we operate, we know what we are going to find, where we are going to find it, and where the artery is going to come into it so that we can go right to it to clamp it off and thus minimize the bleeding. Thanks to our x-ray colleagues, these capabilities are multiplied continually. We are better off than the man who does only surgery. It is wise, in my opinion, that we urologists do not get categorized as just surgeons who want to cut. We are willing to undertake medical treatment for the children with cryptorchidism. If it does not work, we are then capable of operating on them and curing them with surgery. Of course, this philosophy enters into the field of adrenal diseases and into many other disorders that we handle.

In determining when we should operate on a child with an undescended testis, one of the concerns is the growth of the testis itself. Dr. Earl Engle did the first clinical research work in this field 30 or 40 years ago. He measured the tubular diameters and determined that in the normal child's testis, the tubular diameter increased progressively with age. We determined that the increase continued in the child who had an undescended or hidden testis until about age seven, and then it stopped. From this crude physiological index, we have an indication that we should operate on the child and bring the hidden testis into the scrotum before age seven. Our advice to parents and to pediatricians who want guidance in this matter is that age seven is the critical age when the testis should be brought down into the scrotum.

The next question is, when is the optimum time to start treatment before this seventh year? No one likes to do an elective operation before the child is one year old, if it can be avoided. The child is much bigger and stronger and more stable after age one. The child develops the capacity to worry and be upset, and as a consequence, we do not like to do elective surgery until the child is able to talk. If we operate before the child can talk, he is somewhat terrorized by having been taken into the hospital and having been taken away from his parents and then subjected to this smothering, anesthetizing operation on an area of the body, which even at that age may have some more than usual implications. As a consequence, we would like to defer the operation until the child is at least four years old.

The next anniversary of consequence is the fifth birthday because after the fifth birthday some children begin to inspect each other's genitalia. This is not always true, but this has been carefully documented in nursery school children. If you neglect this matter and leave this child deficient in the sense of having one missing testis or a testis that disappears unpredictably, that is, the migratory testis, then you are depriving this child for psychological reasons. You are allowing him to continue in an embarrassing condition in which his self-image could be threatened, and the invitation for possible trouble does exist. You may say that this is exaggerating the problem and that Freud was not always accurate, but there is evidence that this is of importance. If you operate on such a child and his behavior improves markedly, you can look back and realize that he was a very bad actor because of some psychological concern which must, because of the circumstances, have been

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due to the undescended testis. The supportive evidence has influenced us in our decision that the optimum time for fixing the condition is between the fourth and fifth birthday.

We initiate treatment, as a matter of policy, sometime around the fourth birthday—usually hormone treatment, brought to our attention by Dr. Engle who did the pioneer work with the gonadotrophic hormone. He demonstrated in immature monkeys that injections of gonadotrophin will bring the testis down. He transferred this to human patients, and it was found that it did bring down a certain number of undescended testes. Our hormone treatment consists of giving 10,000 units of gonadotrophic hormone in three doses, every other day. These three injections do bring down 15% of the children's testes that are going to come down. If these injections fail to bring it down, we then give the old standard course of 10,000 units over six weeks so that you give 500 units every other day or three times a week for six weeks. The advantage of giving the first 10,000 units all in one week, every other day in three injections, is that there is no enlargement of the penis and no growth of pubic hair. Whereas, with the six-week course, you get a very definite slight enlargement of the penis and a very definite growth of pubic hair in many children. The change is not enough to be grotesque or objectionable, and very often it is very supportive for the child and for the parents. The parents may have felt inadequate, deprived, guilty, or embarrassed about the deficiency of the genitalia of their child; thus, a little growth of the penis does not harm anyone.

The scrotum will often be stimulated to grow slightly, and it will give you a little more capacity to accommodate the new testis if you have to operate on it. There is no harm in giving the gonadotrophin. We have not been able to detect any stunting of growth or damage to the testis with a dosage of 20,000 units distributed over six weeks. We start at the fourth birthday and try to be finished by the fifth birthday, and we would certainly like to have the condition corrected by the seventh birthday.

Dr. Gross, in Boston, reported a number of bilateral cryptorchids on which he did not operate until age 12, and he reported some fertility among these youngsters. It is the only information on the topic, and Dr. Gross is a very sincere and earnest person with a large series of cases. The retrospective analysis of these cases was done mostly by mail, so it is not definite that they were fertile. Furthermore, he based his findings largely upon sperm counts, and the total sperm counts were not really as large as one might want to attest to the fact that these children were fertile. One would like to see a substantial number of sperm, about 100 million and the Gross counts run under 20 or 30 million. Although there is some indication that waiting until puberty does not do irreparable harm, it is not clear, as has been implied in the literature, that if one waits until age 12, that you will have a successful result. I think the opposite is true and it would be better to complete the whole program by age seven.

We treat the migratory testes with gonadotrophic hormones because the three shots usually bring them down. Even though they may not stay down, the doctor can tell the child that it can be brought down at any time, and the child is not quite as worried about the situation. A pediatric psychiatrist on our staff is convinced that the migratory testis is just as much a disturbance to the child as the undescended testis because it disappears in a way that the child cannot control. A three-day-dose course of 10,000 units over five days does not increase the size of the penis. The six week course will definitely increase its size.

The success rate of gonadotrophic therapy in bilateral undescended testis, where there is more likely to be a hormonal deficit, is about 33%. The unilateral cases, where you are more likely to have a mechanically poor point of attachment for gubernaculum, are more difficult. Usually the gubernaculum is attached directly under the skin so that the testis turns back up over the external oblique fascia or in the top of the scrotum. Thus, there is a mechanical reason why it does not come all the way down. In those cases the hormone therapy is not as likely to work. It has always surprised me that it worked in even 15% of the cases. We do have an occasional pleasant surprise, even with unilateral undescended testis and we continue to at least acquaint the parents with the possibility of medical treatment. Sometimes, parents will say, "I do not want to do that because my child dreads needles," or "The one thing he dreads is going to the doctor and the one thing he pleads for is that we will not take him back for needles." If this is the reaction, the parents may not want to have the hormone treatment, that is, at least the long-term treatment. The total success rate with these methods is in the 20% range. Parents should be informed of the possible treatments available and then allowed to make their own decision.

The histology of the normally descended testis

is usually normal, and these children are usually fertile because of the good testis. Yet, the one that is undescended is very often retarded. We regard it as almost always expressing a degree of maldevelopment or poor development as a cause of it being undescended. This is brought out by biopsies of the series that we have tested.

We apply an additional dimension in analyzing all of our tissue. We grow a biopsy for four or five days in a tissue culture medium containing radioactive isotopes, which will be picked up with every mitotic event, put a photographic emulsion on it and develop it. Little black spots will appear where there was activity. This is called "radioautography." Thus, we have a way of expressing the psysiological potential of this tissue in addition to the histology. This activity has very little relation to what the tissue looks like on the *H* and *E* stains, and it is quite revealing. We know now that you cannot tell from the histology what the potential is; in other words, the radioautography gives you a different answer. The appearance of the *H* and *E* stains may look good when it may not really be very good; the opposite may also be true. Thus, the histology alone is not sufficient. There are other methods, and this is a good field for research. We, as urologists, should accept the responsibility of looking into these areas; they are offered to us; we have the opportunity to apply them, and we should provide the populace with the information available to us by applying advanced techniques to our material.

You may try to cure the child, even though the histology may not look very encouraging at the beginning. A defect that is sometimes present with undescended testis is that the epididymis does not link up with the testis. With each operation for undescended testis, you should look at the epididymis to see if this is the case. You will very often find the epididymis separated from the testis by an abnormal distance; look to see if there is an actual failure of union. Tell the parents about this so they not only will know it as a matter of fact, but also, they will not hold you responsible if the child is not fertile at a later date. This does not occur too often, but it does occur often enough to be aware of it and to document it for the record.

Almost all undescended testes have an associated hernia, or at least a potential hernia, in the form of an open processus vaginalis going from the peritoneal cavity down around the cord and enveloping the testis. This potential hernia has to be repaired every time you do an operation. Occasionally, you will find one where the hernial sac is only at the upper end, but more often, it is through the full length of the cord. Since this is almost always present, the next question is, if you give hormone treatment and bring the testis down without an operation, does this hernial sac persist, and will these children develop a hernia sometime later in life? This is, of course, a possibility. Ed Sacher at the Navy hospital in Philadelphia did a study and a follow-up on his patients. He demonstrated that hernias did become clinically evident in a certain substantial percentage, but probably the majority of his patients never developed hernias. This sac may have united and closed off, or the patient may never have pushed anything out into it. It is not enough of a threat to cancel out the effectiveness of hormone therapy. Nevertheless, it does exist, and the parents should be told that the child is more likely to develop a hernia than other children.

Cancer is another possibility. If you leave a testis up in the abdomen, the first sign of cancer may be a chest metastasis. The retained testis inside the abdomen develops a testis tumor and, being inside the abdomen, it cannot be detected. It does not happen frequently enough to be a reason to take out every undescended testis, although this has been proposed. Even though you bring the testis down into the scrotum, it retains the possibility of developing a cancer at a later date. The chance of this happening is not so great as to force you to recommend that an orchidectomy be done, but it is another reason for urging that orchiopexy be done so that the testis is out in the open where it can be watched. Yet, it would be advisable to suggest the options to the parents as a possibility and let them make a decision on their own volition. I have been surprised at how many of the parents know about this and question me about it. Cancers of the undescended testis only rarely develop before puberty, and most of them develop about the age 20. The parents do not know this, and you may get a pair of parents who become panicky about the possibility of cancer and start to watch the child very closely at age six or seven. They are greatly relieved that they do not have to start worrying about it until many years later.

Some conditions include an undescended testis as part of the condition, such as the prune belly syndrome. The children have an absence of abdominal musculature, or at least a deficiency of it. The wrinkled

appearance of the skin is the basis of the so-called prune belly description of the syndrome. These children have massively enlarged ureters, and the ureters may get in the way of the descending testis and prevent it from descending. The cord is practically nonexistent, and the testis is at the bottom of the kidney on each side. In my opinion, it may be worth giving a trial to gonadotrophic hormone therapy, and it may be worth waiting a while, but it is not advisable to try to do orchiopexy on children with prune belly syndrome. It is often the case that the cord is very short. Warn the parents in advance that the odds are that you are not going to be able to get the testis down or even to get it out into the inguinal canal. In many cases, even if you cannot get it down to the bottom of the scrotum on the first try, you can usually get it down on the second try after a couple of years. In this case, with this particular syndrome, be aware at the beginning that you are probably not going to have enough cord to work with, even with two operations.

The technique and surgical principles of orchiopexy utilized in our hospital are as follows. The initial incision should be made in the skin crease. If you cannot make out the skin line, push the skin together and the lines will become apparent. We usually mark the line for precision, taking a lesson from the plastic surgeons. I encourage all of my residents to take some plastic surgical training in their preliminary studies to learn the skin stress lines that we use for our incisions. The initial incision is done carefully. In many cases, the hernial sac will have turned back under the skin, and it will be in the line of your incision. If you cut vigorously into this area, you may cut into the hernial sac or into the testis itself. Be aware that it may be in the subcutaneous fat at the lower end of your incision.

Following incision of the external oblique aponeurosis, the spermatic cord is then dissected free by sharp and blunt dissection. The dissection is carried to the internal inguinal ring and the floor of the inguinal canal, and the transversalis fascia is stretched allowing the surgeon to proceed retroperitoneally. The spermatic vessels are freed toward their origin. If the internal ring is not large enough and the operator cannot reach far enough retroperitoneally to get much length of the vessels, the fascial opening may be made larger. Usually you can open this hole large enough to dissect behind the peritoneum to get all the length needed and the inferior epigastric vessels do not need to be divided. The conjoined tendon may be divided laterally for one-half inch or more giving increased exposure. The peritoneum may be found on the medial side of the spermatic cord and the hernial sac may be opened. The hernial sac is then divided from the vessels and spermatic cord. If this is difficult to do and the spermatic cord cannot be easily dissected away, a hypodermic needle can be used to raise a bleb of saline beneath the surface of the hernial sac and it will lift off and make the dissection easy. The hernial sac is then closed with a purse-string suture of nonabsorbable material. The spermatic vessels are held laterally by strands of fascia, referred to as the "lateral spermatic fascia." This fascia maintains a lateral position of the spermatic cord in the retroperitoneal space, thus forming an angle down toward the scrotum. If one cuts these fascial bands and eliminates the angle, the cord can then drop more medially, and the vessels will take a more direct route into the scrotum. By skeletonizing the cord down to the epididymis even more length can be obtained. I have discovered to my surprise that many of the old-time surgeons who did this sort of operation never went above the peritoneal wall. They confined themselves only to the inguinal area and gained enough length by skeletonizing the spermatic cord so that they could make the testicle come down. By stretching the cord over a finger the operator can become more aware of the thin firm strands of fascia within the cord. By dividing these bands the cord will lengthen just a little more.

Next a finger is placed in the empty side of the scrotum and an Allis clamp is used to tug on the bottom of the scrotum until a point can be found that will stretch the farthest down, and that is where the testicle should be brought to with the traction suture. Having determined this point, an incision is then made through the scrotal wall, as if in a window. A pocket, what I refer to as the subcutaneous or scrotal pocket, can then be developed with sharp and blunt dissection. Here the testicle will lie outside of the dartos and the cremasteric fibers that might pull it back up by muscular action.

An easy plane can be developed from the incision under the skin, and a pocket can be developed both downward and upward. Most of the skin on that side of the scrotum must be liberated in order to make the pouch big enough. By passing the fingers down within the scrotum an incision can be made down onto the finger. Using a long clamp and

following the finger up into the groin the clamp can be used to take hold of the testicle and draw it down through the canal and out the scrotal opening. The testicle, having been pulled out through the side of the scrotum, can now be fixed in the pocket.

We take an atraumatic round needle with 3.0 silk and pass it through the tunica vaginalis. Then the needle is passed through the very bottom of the scrotum in a new location. Interrupted sutures of chromic atraumatic 5.0 are used to close the scrotum. The testicle is then kept in the subcutaneous pouch and the groin wound is closed in a routine manner.

The traction sutures should be an extension of the line of pull which you want on the testis to keep the cord down. In the technique that we recommend, the sutures are applied to the testis and brought to the opposite leg. If too much tension is placed on the cord, you will squeeze it flat and bring about ischemia. The next day there will be edema of the testis and edema of the scrotum, which means necrosis, an infarction and the death of the testis. The traction should be very gentle. We put on just enough traction to keep the thread from sagging; as the child moves around in bed, he will give a tug on it several times a day, and that is all you need. If there is too much tension, not only is it going to be painful, but it will also probably destroy the testis. That is one reason why the old Torek operation, where the testis was sewn directly to the fascia of the leg, through a counter incision, frequently brought about necrosis of the testis. It was too tight and rigid, and it destroyed the testis rather than helped it.

Over the years we have used a variety of substitute testes (prosthetic testes), including ping pong balls and marbles, in children and adults who had a missing testis. Then they were made out of hard plastic or metal. The Dow Company developed prosthetic testes made of silicone rubber. We have been using them for several years, and they are more or less elastic. In the last few years, the 14- and 15-year-olds have complained that these testes are too hard and they want them to feel more natural. The Dow Company then developed jell-filled silicone silastic testes which have a beautifully normal consistency. They come in several different sizes and have little tabs on the end. You want to be able to put a suture through the tab to suture it to the bottom of he scrotum so that it will retain the desired position. A purse string is then put around the neck of the scrotum and it is sutured. We replace these as the children grow bigger to keep pace with their normal size. A larger than normal size is needed for a child who has only one testis. His good testis is going to undergo compensatory hypertrophy or, at least, it is going to grow to a larger than normal size. Consequently, we have one super size, the fourth size, which is bigger than normal, for that reason.

In summary, there are many reasons why orchiopexy should be done, and certainly, the cancer worry is a very distinct one. Yet, I think the psychological reason, the "locker room appearance" situation, is the most frequent, and therefore, an important factor. I do think that we should exercise our favored position of being able to offer hormone treatment first. If that does not work, then go on with the surgery as required. The timing, in my opinion, should be to start at the fourth birthday and to have the program completed by the fifth birthday. Although physiological considerations do enter into our choice, the precise definition of this time interval is primarily decided on the psychological aspects of the matter. I urge you to consider these, and I think that you will find the fourth-to-fifth-year interval works out very satisfactorily.