TORSION OF THE SPERMATIC CORD.

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ACUTE and recurring torsion of the spermatic cord with resulting infarction or gangrene of the testis has not attracted much attention. Although the condition is of relatively rare occurrence, it is quite possible that if it were more often considered in the diagnosis of affections of the testis, more cases would find their way into the literature.

Torsion of the cord occurs most frequently in young men. Of fifty-three cases in the literature, the average age was 19. Seventy-seven per cent. were in men of 25 or under, and 47% of the total occurred between the ages of 15 and 25. Taylor² reports a case occurring in a child four hours after birth and Nicoladini,³ one in a man of 62.

The right testis is affected somewhat more frequently than the left. Of fifty-seven cases in the literature, thirty-four were of the right and twenty-three of the left testis. In thirty of these fifty-seven cases, the testis was incompletely descended. Of these thirty, however, four were entirely intra-abdominal, so that from these figures it would appear that torsion in the fully descended testis occurs practically as often as in the partially descended testis.

The presence of hernia accompanying the twisted testis was mentioned in but four cases, in three of which the testis was in the inguinal canal. In view of the fact that we now know that a hernia accompanies practically all undescended testes, we must conclude that the presence of hernia was omitted from the case reports of the undescended cases or was overlooked in the presence of the more acute lesion, torsion.

The chief predisposing cause for torsion of the spermatic cord is a developmental abnormality in the attachment of the cord to the epididymis and testis. In a normally attached testis the common mesentery is formed by the reflection of the parietal layer of the tunica vaginalis onto the epididymis and testis. The upper limit of this mesentery is the center of the globus major, while the lower limit is the lower pole of the testis or the tip of the globus minor. In cases of torsion of the cord, however, this common mesentery is attached to but a small portion of the epididymis, usually the globus major; and the remainder of the

testis and epididymis lie free in the tunica vaginalis. The condition has been compared, by various writers, to fruit hanging by the stalk. Rigby and Howard,⁹ Dowden,¹³ Scudder,⁸ and others report cases of torsion in all of which this abnormality of attachment was present.

An abnormally loose scrotum and a voluminous tunica vaginalis have also been thought to be predisposing factors for torsion of the cord.

Murray¹⁰ believes that torsion of the testis is always of congenital origin; that some degree of rotation occurs during the passage of the testis from kidney to scrotum, which later results in thrombosis with any sudden vascular changes in the cord. If such were the chief predisposing factors, however, it seems probable that torsion of the cord would be of far more common occurrence.

The exciting cause of torsion of the cord is not known. In many cases there is a history of the performance of some unusual labor shortly before the onset; and this has been held by many writers to be an important factor. In several cases, however, the onset had come while the patient was asleep and in others just as he was arising. In a few cases there was a history of antecedent injury to the testis. No single factor appeared to precede the onset in every case or to be in any way related to it.

The pathological findings in a case of torsion of the cord will vary with both the duration and the completeness of the twist. In any case the tissue of the scrotum will be more or less tense and edematous. The tunica generally contains a small amount of fluid. In an early acute case this fluid is straw colored but in older cases of complete torsion it is blood stained and the color of prune juice. The testis and epididymis below the twist are of bluish black color, like that of a piece of strangulated gut. In none of my cases was there any noticeable change of color after the application of hot towels and detorsion. Dowden¹³ reports cases of partial torsion operated early in which this was seen. In each of my cases the testis was freely movable in the tunica vaginalis, but no abnormal laxity of this sac was observed. The twist of the cord is always intratunical, between its attachment to the testis and the reflection from it of the tunica vaginalis. Taylor's case² is the only exception to this found in the literature. Because of the vague terms used in describing the torsion, it is difficult to tell exactly the direction usually followed. In my

cases, however, the twist was from within, outward and forward, and this is apparently the more usual direction. The twist may, however, be in either direction¹². The number of turns of the cord varies from one-half to five¹¹, the former being rather more frequent. Marked anemia of the structures of the cord is found at the point of the twist. Below the twist, the vessels are thrombosed and there is total infarction of all the tissues. Howard¹² reports that one of his specimens showed no trace of normal tissue but resembled a blood clot when sectioned. Above the twist, marked congestion of the vessels is found. Hemorrhage into the tissues of the cord may be present. The congested tissues of the cord show a tendency to be in a long spiral as they descend, doubtless being dragged somewhat by the tunica vaginalis, which would tend to twist with its contents. This appearance of the cord may give the impression that the twist is located in the inguinal canal rather than in the tunica.

In all of my cases, the cord was abnormally attached. In Case 1, the entire globus major and also the globus minor were free, the cord being attached only over the body of the epididymis for a distance of about 2 cm. In Case 2 the cord was attached over a relatively smaller area situated at the globus major. The body of the epididymis and the globus minor were free. In Case 3, inversion of the testis in addition to an abnormal attachment of the cord was found. The globus major lay at the lower pole of the testis, the body of the epididymis in front of the testis and the globus minor at the upper pole of the testis. The spermatic cord here descended into the tunica vaginalis and was attached to the globus major and the body of the epididymis. The vas deferens descended in the cord and then turned sharply upwards and passed along the body of the epididymis to the globus minor at the upper pole of the testis.

Clinically, we may recognize two general types of torsion cases,—acute complete torsion of the cord and acute partial torsion of the cord. The latter condition is prone to be recurrent. The symptoms of the two types differ only in the degree of their severity and duration.

In acute complete torsion of the cord, the onset is very sudden with severe pain in the testis. This pain often radiates along the inguinal canal and may radiate down the thigh or into the pel-

vis. Vomiting often occurs at the onset, but does not persist. More or less shock and prostration is present at first. Fever does not occur early but one or two degrees may be present later in the course of the condition. The testis is tender soon after the onset. After twelve or eighteen hours the scrotum becomes slightly red-hot, swollen and very tender on the affected side. Edema of the skin was present in two of the writer's cases. The epididymis may be palpated in front of the testis, especially if the case is seen early. In cases seen several days after the onset, the relations of testis and epididymis cannot be defined because of their swelling and the presence of some degree of hydrocele. The spermatic cord in the inguinal canal is neither enlarged nor tender save near the point of torsion. The prostate and vesicles are negative to rectal examination.

In partial torsion of the cord the symptoms are similar but less severe. Recurrent attacks of pain occur in the testis, followed by slight swelling of the scrotum. The pain is often mild and of a relatively short duration. Vomiting and fever are unusual.

In any case after detorsion, the symptoms disappear as quickly as they arise. Untreated, the pain, tenderness, and swelling persist for many days. Recurrences are common in untreated cases. Murray¹⁰, Attlee¹⁴, Corner¹¹, Howard¹², and others report atrophy of the testis after one or more attacks of torsion.

The diagnosis of torsion of the spermatic cord should not be difficult. Acute gonorrheal epididymo-orchitis has a history of preceding urethral discharge, ceasing with the swelling of the testis. The systemic reaction is more marked, there generally being several degrees of fever present. Rectal examination and a urinary examination will generally show the presence of chronic prostatitis and vesiculitis.

A strangulated indirect inguinal hernia may closely resemble torsion of an undescended testis. The absence of the testis from the scrotum on the affected side and the history of its presence in the canal should suggest the possibility of torsion of the cord rather than hernia. Vomiting, obstipation, and distention are not generally seen with torsion of the cord. The symptoms of torsion of the cord tend to improve in a week or less, while those of strangulation grow steadily worse.

The prognosis in torsion of the cord is excellent. No fatal case was found in the literature. Atrophy of the testis is a very probable outcome whatever treatment is employed.

The treatment of torsion of the cord depends on whether or not the testis is fully descended and on the duration of the torsion.

In any case seen shortly after the onset of the symptoms, detorsion should be attempted. Since the usual direction of the twist is from within outward and forward, the reverse should first be attempted. Increasing pain demands that an attempt to turn the testis in the other direction be made. Dowden¹³ reports that successful detorsion is marked by a peculiar shucking sensation and the immediate relief of the pain in the testis. Prag¹⁰, Dowden¹³, Attlee¹⁴, Williams¹⁷, and others report torsion cases relieved at once by detorsion. Some patients learn to untwist the testis themselves, if occasion arises.

If detorsion cannot be done, an operation is necessary. In fully descended testes, an incision is made in the scrotum and the tunica vaginalis opened. An attempt is made to untwist the cord and to restore the circulation to the testis by the application of hot towels. If the case is not seen early, this attempt will fail. Orchidectomy should then be performed.

If the circulation returns, even in part, Dowden¹³ recommends the following plastic operation which he has used several times successfully. The entire parietal layer of the tunica vaginalis is removed. The visceral layer of the tunica over testis and epididymis is scarified. The testis is sutured to the scrotum with one or two catgut stitches through the tunica albuginea.

It seems feasible in these cases not to remove all the parietal layer of the tunica but to leave a portion of it posterior to the testis. Suturing this as well as the testis to the scrotum should hold the testis much more firmly. No opportunity, however, has yet arisen for this to be tried, for all cases here reported demanded orchidectomy.

The best treatment for torsion of an undescended testicle is orchidectomy. If, for any reason, this cannot be done, a plastic operation returning the testis to the scrotum, if possible, and at least fixing it to prevent future twists, is indicated.

In recurrent partial torsions, Dowden's operation described above is indicated.

If no operative interference is allowed, expectant treatment with rest, scrotal support and an ice bag is a temporary relief to the patient.

CASE REPORTS.

CASE 1. From the Fourth Surgical Service, Boston City Hospital, by courtesy of Dr. Paul Thorndike.

A healthy man aged 27. Married. One child living and well. Admits gonorrhea 7 years ago, lasting about 4 months, with no known complications. No urethral discharge since that time.

At irregular intervals for some years has had attacks of pain in right scrotum lasting a short time and then disappearing. Noticed scrotum was usually slightly swollen for a few days after each attack.

Ten days before admission, while shoveling wet sand, was seized with very severe pain in right scrotum radiating into inguinal canal and down right thigh. No vomiting. Bowels regular. No urinary difficulty. No urethral discharge. No known fever. On the following day, the right side of scrotum was red, swollen, hot, and very tender. Was treated with ice bags and scrotal support, with some improvement, but tenderness and swelling persisted and patient was unable to work.

On admission the general physical examination was not remarkable. The right scrotum was swollen, red, and hot. The skin was edematous. Testis and epididymis could not be distinguished but were markedly larger than on the left. The cord was slightly tender and enlarged up to the external ring. There was no impulse with coughing. The prostate and vesicles were apparently normal to rectal examination. The urine was negative. There was no fever and the pulse was not accelerated.

Operation. Dr. H. M. Clute, by courtesy Dr. Thorndike.

A 2½" incision made along scrotum. Tissues tense and edematous. Tunica opened with escape of a few drachms of sero-sanguinous fluid. Epididymis presented in front. Testis and epididymis of dark purple color. Testis hung from cord like fruit on stalk. A half twist of the cord from within outward and forward found just inside the tunica vaginalis. The circulation failing to return after detorsion, orchidectomy was performed.

The patient made an uneventful recovery.

CASE 2. From the Third Surgical Service, Boston City Hospital, by courtesy of Dr. E. H. Nichols.

The patient, a healthy boy aged 18. Never sick before. Absolutely denies all venereal disease. Five days ago, while walking to work in the early morning was seized with severe pain in the right scrotum, radiating into the inguinal canal. On the following day, the right side of the scrotum became red, hot, swollen, and tender. There was no known fever. No vomiting. Bowels moved daily. The pain was somewhat relieved by ice bags but the swelling and tenderness persisted.

On admission the general physical examination was negative. The right side of the scrotum was swollen, red, hot, and very tender, especially at the upper portion. The skin was edematous. The testis was swollen to about twice the size of the left one and it was thought that the epididymis could be palpated in front of the testis. There was no urethral discharge. The prostate and vesicles were negative.

A diagnosis of torsion was made and detorsion was attempted without success.

Operation. Dr. E. H. Nichols.

An incision made from external ring well down the scrotum. The tissues were edematous, and above the tunica vaginalis the tissue of the cord descended in a long spiral. The tunica was opened with the escape of a few drachms of dark blood-stained serum. The attachment of the cord to the testis was at the globus major and was so limited that it was no more than 5 cm. diameter. The testis and epididymis were somewhat swollen and of blue black color. There was a half twist of the cord, intratunical, from within outward and forward, which was untwisted, with no return of circulation. The testis was then removed.

The patient made an uneventful recovery.

CASE 3. From the Fourth Surgical Service, Boston City Hospital, by courtesy of Dr. Paul Thorndike.

Patient a healthy young man aged 21 who had never been sick before. Denies positively all venereal disease. Has had an occasional balanitis.

Six days ago, while scuffling with a friend, received a slight blow in the scrotum, which was painful for only a few minutes. Five days ago

noted "a heavy feeling" across back and down thighs while standing. Four days ago, while pulling on his shoe just after rising, was seized with very severe pain in right scrotum that ran up into the inguinal canal. After taking some milk of magnesia, patient vomited several times. The following day he noticed that the right side of his scrotum was red, hot, swollen and very tender. The pain and tenderness have persisted.

On admission the general physical examination was not remarkable. The right side of the scrotum was red, hot, tender, and swollen to about twice its normal size. The skin was edematous. A small degree of hydrocele was present. Testis and epididymis could not be differentiated by palpation. No urethral discharge. Urine negative. Prostate and seminal vesicles negative. Temperature 100 degrees F. on admission but normal ever since. Pulse normal.

A diagnosis of probable torsion of the cord was made and detorsion attempted with no results.

Operation. Dr. John Duff, by courtesy of Dr. Thorndike.

A 5 cm. incision in the scrotum. All layers were edematous. On opening the tunica, several drachms of dark colored serum escaped. The testis and epididymis were blue black in color. The cord was attached by a pedicle to the globus major, which lay at the lower pole of the testis—"inversion" of the testis. There were $2\frac{1}{2}$ full turns of the cord inside the tunica just above its origin on the testis. The circulation failing to return when the cord was untwisted, the testis was removed.

The patient made an uneventful recovery.

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