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Clinical Problems

Torsion of the Testis and its Appendages

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Summary

In a survey of 101 cases with an index diagnosis of torsion of the testis or its appendage, there were 86 instances of torsion of the testis and 14 of torsion of the hydatid of Morgagni. In 38 of the patients with testicular torsion there were one or more "warning" attacks of pain and swelling, due to torsion which became spontaneously untwisted. In 19 cases operative fixation was performed because of this warning history, and all the testes were preserved. In the other 19 the testes were not explored until the patient came in with a severe "classical" episode of torsion: seven of these testicles were lost from gangrene or delayed atrophy.

In 31 cases torsion resulted in failure to save the testis. Of these, 20 were misdiagnosed and treated initially as epididymo-orchitis, despite there being no evidence of a urinary tract infection. There is no excuse for not exploring any actually inflamed testicle which is unaccompanied by definite evidence of urinary or urethral infection.

Introduction

Though torsion of the testis was described by Delasiauve as long ago as 1840¹ it has taken an unconscionable time to get into the general awareness of doctors and to become accepted as a relatively common and serious surgical emergency. At the London Hospital neither Curling² nor Hutchinson³ were aware of this condition when writing about the testicle, and it was not until 1907, when Rigby and Russell Howard⁴ wrote their classical paper on torsion, that the condition was widely recognized. Since then there has been no want of interest in torsion or lack of awareness about it in this hospital.⁵⁻⁹ In spite of this cases are still explored at too late a stage for the testicle to be saved. We recently asked ourselves why this

disaster is not prevented more often than it is. Where does the fault lie? Can anything be done to improve matters? In an attempt to answer these questions we have reviewed the experience at this hospital over the past 23 years.

Methods and Materials

We have examined the records of 101 cases with an index diagnosis of torsion of the testis or its appendages referred to the London Hospital during 1948 to 1971 or treated by one of us (A.J.W.) in either of two regional hospitals during the same period. The 91 London Hospital cases follow on the series described by Kennedy.⁵

On scrutiny of the case records of these 101 cases the index diagnosis of torsion of the testis was accepted in 85 instances, of torsion of the hydatid of Morgagni in 14, and of torsion of a lipoma of the scrotum in 1 case. One case was rejected; in retrospect it was clearly an example of idiopathic oedema of the scrotum.¹⁰

Operative Technique.—Our policy is to explore the affected testicle through a transverse scrotal incision. The tunica vaginalis is opened longitudinally and the diagnosis confirmed. The twist is undone and the viability of the testicle assessed. If it seems viable the tunica vaginalis is everted, as in a Jaboulay procedure, and three chromic catgut sutures are passed through the dartos and tunica albuginea of the testicle to prevent the possibility of further torsion. The other testicle is explored and fixed in a similar manner at the same session. The skin is closed with catgut sutures without drainage. The reason for fixing the other testicle at the same time is because of the possibility of torsion in this testicle. In most of the cases where the other side was explored there was an abnormality in the anatomy similar to that on the side in which the torsion occurred.

Torsion of Testis

Torsion of the testis occurred in 85 patients, in one of whom it was bilateral.

Aetiology.—The left testis was affected nearly twice as often as the right (54:30). The ages of the patients ranged between 5 weeks and 54 years, and there was the usual preponderance of adolescent cases (Table I). Malescent was associated with

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TABLE I—Occurrence of Torsion in Different Age Groups

	Age (Years)									No. of Patients
	<6	6-10	11-15	16-20	21-25	26-30	31-35	36-40	>40	
Torsion of testis	8*	10	27	16	12	4	4	1	3	85
Torsion of hydatid of Morgagni		6	8							14

* Two of these occurred in the first year.

torsion in only four patients (4.7%). In four others the testicle had been noticed to be unusually mobile at some time before surgical exploration.

Clinical Features.—On going through the records it was soon clear that there were two different patterns of presentation. The first was the classic clinical history of a sudden onset of pain and swelling out of the blue, bringing the patient to hospital, where eventually torsion is diagnosed in the first and only attack. This was found in 47 (55%) of the patients. In the second type of presentation, which occurred in 38 cases (45%), the patient had one or more obvious episodes of previous torsion—that is, attacks of pain and swelling which were immediately and usually suddenly relieved as the testicle became spontaneously untwisted. One patient had as many as 100 episodes. In half of these cases (19 patients) this clinical story was recognized for what it was and the testis was explored and fixed before the final irrevocable torsion took place. In the other half, unfortunately, no notice was taken of these preliminary warning attacks and torsion was diagnosed only when the final severe episode brought the patient to surgical exploration. In six patients there was a suggestive history of injury or "strain," though in most instances this was not severe. The remainder of the clinical features are shown in Table II. There was nothing remarkable about them: severe

TABLE II—Clinical Features in 67 Cases of Acute Torsion occurring in 66 Patients

	No. (%) of Cases
Pain:	
Severe scrotal	43 (64)
Mild scrotal	12 (18)
No pain	1 (1.5)
Confinement to abdomen initially	6 (9)
Confinement to groin	5 (7.5)
Vomiting	23 (34)
Nausea	5 (7.5)
Fever >99°F (37.2°C)	18/58 (31)
Urinary symptoms	3 (4.5)
Onset during sleep	4 (6)

pain was noted in only 64%, and only 42% had nausea or vomiting. In 18% the pain was mild and in one case absent. Some of the clinical features were positively misleading—three men had urinary symptoms and one in three had a fever.

Mistaken Diagnosis.—The most common error in diagnosis was to call torsion epididymitis. This mistake was made in 30 of the 67 acute examples of torsion and led to delay in diagnosis and the loss of 20 testicles.

Findings at Operation.—In every case the torsion was the typical intravaginal twist (Table III). There were no examples of extravaginal torsion, which is as a rule seen only in neonates and infants under the age of 1 year, although it has occasionally been reported in older children.¹¹⁻¹³ In 19 of the 62 cases explored as emergencies (28%) the testicle was found to have

TABLE III—Operative Findings in 67 Acute Torsions

	No. of Cases
Gangrenous testis	24
Spontaneously reduced torsion	19
Testes which underwent atrophy after untwisting	3
Testes which underwent atrophy, operation being deemed useless, because of length of history	5
Total testes lost	32

untwisted at the time of operation. In 19 others the testis was explored in the interval between attacks of torsion. From these findings the message is clear: if atrophy of the testicle is to be prevented then the testis must be explored promptly, and preferably before the acute episode which brings death to the testicle. In the entire series of 86 torsions no fewer than 38 (44%) gave definite warning signals. Had they been acted on in time another seven testes would have been saved in addition to the 19 which were saved because the warning was heeded. Since some men do not have such warning episodes of torsion it is imperative that operation is performed promptly when a twist does occur. In 30 of the 31 instances where the testicle was lost the history had been longer than 24 hours, and in 67% of them an initial misdiagnosis of epididymitis had been made.

Torsion of the Hydatid of Morgagni

Aetiology.—Torsion of the hydatid of Morgagni occurred in 14 cases, 8 on the left and 6 on the right. The patients were aged 8 to 14. None of them had an associated maldescended testis.

Clinical Features.—Previous warning episodes were present in six instances, in all but one of which it took place within the week before admission. The length of history varied from six hours to seven days. In five cases there was a history of injury or violent movement, but in no case were the main symptoms very different from those commonly found in torsion of the testicle proper (Table IV). In five cases, however, the swollen hydatid was felt.

TABLE IV—Clinical Features in 14 Cases of Torsion of the Hydatid of Morgagni

	No. of Cases
Pain:	
Severe scrotal	12
Mild scrotal	2
Vomiting	2
Fever >99°F (37.2°C)	4/13
Urinary symptoms	0
Onset during sleep	0

Findings at Operation.—In two instances the hydatid was found to have spontaneously untwisted by the time the testicle was explored.

Discussion

In this series 54 (63%) out of 86 of the testicles were saved. Only 16 (33%) of the 48 which were found to be twisted at operation, or in which operation was deemed useless, failed to atrophy. When exploration was performed as an interval operation because the history of recurrent episodes of pain was correctly interpreted, and if the testicles had spontaneously untwisted themselves by the time they came to operation, then the results were much better; not one of these 38 testes failed to survive. The moral is obvious: the diagnosis must be made *before* a severe torsion occurs.

The salvage rate of 63% of testicles reported here compares well with the salvage rates of 20% reported by Allan and Brown¹³ and 10% culled from the literature by Barker and Raper.¹⁴ This may perhaps reflect the local interest of the surgeons of this hospital, which stemmed from the teaching of Rigby and Russell Howard. These figures do not include patients with a history of recurrent subacute torsion. There are still far too many patients who do not appear at the hospital until they have had several days of mistreatment for a misdiagnosed epididymitis. The surgeon can do nothing about these cases; the fault lies with the general practitioner.

If the general practitioner is aware of the condition he can not only refer the case at once to hospital but, as Sparks¹⁵ has shown, can often untwist the testicle manually if he sees

the boy at a stage before the scrotal skin is so oedematous that the testis cannot be felt and untwisted. Sparks's work at Rugby School has established very clearly the value of prompt action on the part of the general practitioner.

How sad it is that even now young patients lose their testicles because of a supposed diagnosis of epididymitis. Epididymitis hardly ever occurs unless there is frank evidence of urinary infection or obvious urethritis, and in any case little harm is done by making an exploration whenever there is any doubt about the diagnosis. In all cases where the swelling is not confined to the epididymis and where there is no pus in the urine and no urethral discharge the swollen testicle must be explored.

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Scientific Basis of Clinical Practice

Mechanism of Ventricular Ejection

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The basic mechanism of ventricular ejection is simple (Fig. 1). The muscle of the ventricular walls begins to shorten and the ventricular volume begins to decrease and deform. This produces a rapid and propagated rise in the pressure of the contained blood which leads to closure of the atrioventricular valves (a). The ventricle is then a closed space, and its continuing contraction is described as isovolumetric (b). During this phase the pressure rises very rapidly until it exceeds that in the aortic or pulmonary root. At this time the semilunar valves open and the ventricles begin to eject blood (c).

Initially, the pressure in the left ventricle is greater than that in the aortic root, but in the latter part of the ejection phase the pressure gradient reverses and ejection continues by virtue of the inertia that has been imparted to the blood. This reversal of the pressure gradient across the aortic valve causes closure of the valve as soon as the velocity of blood flowing through the valve orifice has fallen to zero. The ventricle is once again a closed chamber, and the phase of isovolumetric relaxation begins (d). As soon as the intra-ventricular pressure falls below that of the atrium the atrio-ventricular valves open and the ventricle fills, rapidly at first (e) and then more slowly (f). The contraction of the atrium (g) adds a small and variable amount of blood to the ventricular volume, and the cycle then repeats.

The simplicity of the sequence of events thus stated conceals the complexity of the individual processes, which is apparent on detailed study. We shall consider these processes in some detail before considering the characteristics of the heart as a pump and the extent to which it is adapted to its function.

Activation of Myocardial Contractile Mechanisms

Myocardial fibres have properties which are intermediate between those of skeletal muscle and those of visceral smooth

muscle. They share with skeletal muscle a striated appearance when seen under the light microscope, and a one-to-one relationship between action potentials and activation of the contractile mechanism. They differ from skeletal muscle in

FIG. 1—Left. Diagram to show the aortic pressure, the left ventricular pressure, the left atrial pressure, and the intraventricular volume demonstrating: (a) the closure of the atrioventricular valve; (b) the phase of isometric contraction; (c) the opening of the aortic valve; (d) the closure of the aortic valve; (e) the phase of rapid ventricular filling; (f) the phase of reduced filling; (g) the effect of atrial contraction. The peak ventricular pressure; (k) the duration of ejection (l), the maximum rate of increase of the ventricular pressure, dP/dt max, (m) and the maximum rate of ventricular ejection (n) are indicated as measures which may be used to describe the changes produced by adrenaline, illustrated in the right-hand panel.

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