has been replaced (Syme). Fungus should never be pulled upon for fear of drawing out the entire contents of the testicle.

In severe, long-standing cases, where a testicle is the seat of chronic induration full of fistulæ, or with a large, obstinate fungus, orchidectomy is advisable, sometimes necessary, in order to remove from the patient a source of physical irritation, and to save him from serious injury to the general health.

CHAPTER IX

TUBERCULOSIS OF THE TESTICLE

Tuberculosis affects the testicle in two ways:

1. Diffuse miliary tuberculosis, associated with general miliary tuberculosis, and of no interest to the surgeon.

2. Circumscribed tuberculosis, which concerns us here. This form of tubercle appears as localized deposits, one or more, usually beginning in the epididymis, and involving the testicle only secondarily.

Etiology

The *predisposing causes* of epididymal tuberculosis are three: 1. The tubercular diathesis. 2. The existence of a focus of tuberculosis elsewhere in the body. 3. Local trauma or inflammation (precedent or persistent).

Although the profession is by no means agreed in the matter, it has been my personal experience that, when there is tuberculosis in the testicle, tubercular lesions may invariably be discovered elsewhere in the body, the patient almost always has tubercular antecedents, and there is often some local disturbance to determine the localization of the tuberculosis.

The *efficient cause* is the tubercle bacillus.

Pathogenesis.—There are three theories concerning the genesis of genital tuberculosis:

1. That it is primary in the prostate or the seminal vesicles whence the epididymis is invaded secondarily, the inflammation extending along the vas, or, possibly, by way of the lymphatics (Kocher,[1] Lancereaux,[2] Guyon [3]).

2. That genital tuberculosis is primary in the epididymis, secondary in the prostate and seminal vesicles (Réclus,[4] Senn,[5] Councilman [6]).

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[1] *Op. cit.*, p. 326.
[2] Guyon's Annales, 1883, i, 153.
[3] *Ibid.*, 1891, ix, 445.
[4] Du tubercule du testicule, Paris, 1876.
[5] Tuberculosis of the Gen.-Urin. Organs, 1897, p. 48.
[6] Dennis's Surgery, 1895, i, 246.

3. That the tuberculosis, whether occurring primarily in the one end of the seminal canals or in the other, may be due to inoculation during coitus (Verneuil, Jacobson,[1] Paladino-Blandini[2]).

Two questions, therefore, arise, Can the inoculation take place during coitus? Is the epididymis invaded primarily or secondarily?

As to infection during coitus, no one holds that such infection is at all frequent. The question is whether or not it ever occurs. Tubercle bacilli have been found in the healthy epididymis (Jani and Weigert[3]), and Paladino-Blandini has recently shown that all bacteria, tubercle bacilli among others, when deposited on the mucous membrane of the urethra near the meatus may reach the epididymis, but cause no inflammation there under ordinary conditions. Yet these experiments, though very interesting as showing that immobile bacteria can travel against the current, and thus giving experimental evidence of the propagation of disease along the vas, prove only that infection in coitus is barely possible, for the combination of circumstances postulated—viz., a massive urethral inoculation and a trauma to the testicle, would be, clinically, hard to find. Inoculation *per urethram* is, to say the least, improbable.

Is the testicle invaded primarily or secondarily? The highest authorities are divided on this point, and perhaps this division is founded on a diversity of cases, some primary, some secondary. There is no question here of the primary focus in the body, but only of the primary focus in the genital tract. Is it in the testicles, or is it in the prostate and vesicle? I cannot answer the question except by an array of facts, all of which seem to point towards the same conclusion: 1. I have examined the urine of every case of tubercular testis that I have seen in the last ten years, and in no case have I failed to find in the urine either shreds or pus indicative of a prostatic congestion, though there be no discharge whatever at the meatus. 2. I have often seen tubercular prostatitis and vesiculitis without any lesion of the testicle. 3. When, one testicle being already involved, the other one becomes implicated, I am confident that a tubercular prostate forms the bridge from one side to the other, and therefore the second testicle, at least, is not involved primarily.

To sum up: with a tubercular testis the prostate is never normal (though I confess that its congestion may possibly be similar to that seen about the mouth of the ureter in tubercular kidney) and is sometimes manifestly tubercular to rectal touch. On the other

[1] *Op. cit.*, p. 323. [2] Guyon's Annales, 1900, xviii, 1009.
[3] Virchow's Archiv, 1886, ciii, 522.

hand, with a tubercular prostate or vesicle the testicle is not necessarily involved. Involvement of the prostate precedes involvement of the second testicle. The migration of the bacteria in sufficient numbers to cause damage is rendered intelligible by Paladino-Blandini's experiments, referred to above, which, while they do not reproduce the conditions requisite for infection in coitus, do represent with sufficient accuracy the conditions of so-called ascending inflammation. All the weight of this evidence goes to show that, in many, if not in all cases, the prostate or vesicle is tubercular before the testicle becomes so.

The *age* at which tubercular inflammation is most common is between twenty and thirty. Fully half the cases occur between these years, and the disease is very rare before fifteen and after fifty.

By reason of its more sluggish circulation the left testicle is more often affected than the right.

Morbid Anatomy

Authorities differ as to whether the epithelium or the intertubular tissues of the *epididymis* are first involved, and on these differences build a support to their views upon the primary or secondary nature of the disease. Suffice it to know that the primary tubercles conglomerate to form the hard masses so typical of beginning tuberculosis. These go on usually to caseation, suppuration, and fistulization, or else cicatrize or calcify.

The Vas.—The vas is often lumpy with tubercular deposits, distended by the products of inflammation, and often involved in a perideferentitis throughout its length. When present this thickened, knobby vas is one of the characteristic features of the disease. The *vesicle* and *prostate* are usually tubercular.

The Testicle.—The testicle is often encroached upon by a tuberculoma or by an abscess. Though primary tuberculosis of this organ is rare, examinations by various authors of testes obtained by castration have almost always shown a more or less widely disseminated beginning tuberculosis of this gland. This discovery has usually been hailed as a startling proof of the advantage of total castration, it being very justly urged that the lesions in the testicle would be overlooked by the surgeon intent upon some conservative operation. It seems more than probable, however, that these lesions of the testicle are often present in cases treated by conservative operations, as well as in those not treated surgically, and that in most instances the testicle is able to overcome the infection if given an opportunity, although the occasional appearance of purely orchitic abscesses after epididymectomy is evidence that the enemy is not always repelled.

The Vaginalis.—The tunica vaginalis may be studded with tubercles, producing chronic hydrocele.

The Urinary Organs.—The urinary organs are often affected with the genital organs. Such cases form a picture of complete genito-urinary tuberculosis. Either the urinary or the genital tuberculosis may be primary (p. 598).

The Lungs.—The lungs are often enough spared. Thus Kocher among 451 autopsies on cases of urogenital tuberculosis found as many as 95 (21%) with normal lungs. During life the pulmonary involvement is often insignificant. On the other hand, Réclus found among 500 phthisical patients 64 with genito-urinary tuberculosis, 45 with involvement of the genital tract, and 19 with tubercular testes only.

Symptoms

The patient, a young man often with tubercular antecedents, comes complaining that one testicle is larger than the other. The swelling may have been spontaneous or it may have followed injury, or perhaps a previous gonorrheal epididymitis never got quite well and now has begun to swell again. Questioning may disclose a family or a personal history of tuberculosis, or an account of frequent and painful urination perhaps slight, previous, or still existing. The epididymal lesion is usually tender, rarely painful.

Less often the onset is acute. The testicle is greatly swollen and hard. There is considerable pain, and the vaginalis rapidly fills. This condition may subside, leaving a few nodules here and there, or it may go on to suppuration.

Upon examining such a testicle it is usually found somewhat enlarged throughout, with large, hard nodules at one end or the other of the epididymis, or throughout its length. There may be lumps in front in the testicle itself. The outline of the tumours may be obscured by fluid in the tunica vaginalis. The vas deferens is often knotty, enlarged, and hard, as far as it can be felt, and a finger in the rectum may detect the seminal vesicle similarly affected. Nodules may perhaps also be detected in the prostate and vesicles; the urine contains prostatic shreds and pus in small or large quantity, and there are, perhaps, symptoms referable to tuberculosis of prostate, bladder, or kidney. The lungs, too, may be involved. Until suppuration occurs the testicle is practically painless, testicular sensation is not materially reduced, and the opposite testicle is not usually affected. Sexual power and desire are influenced only by the fears of the patient. Later, if both testicles are destroyed potency may become impaired.

The malady advances slowly, sometimes remaining stationary for

many months; finally, the nodules soften into abscess, the skin adheres, and the abscess bursts and discharges a thick, cheesy material. These abscesses remain fistulous for a long time, sometimes indefinitely, the fistulous tract being marked by great induration. New abscesses tend to form, pointing by old or by new routes. After abscess of the substance of the testis, hernia testis may come on. When the disease invades the scrotum the inguinal glands enlarge. Such a condition is often mistaken for cancer. A patient may have both testicles indurated, knotted, full of fistulæ for years, and still seem to enjoy excellent health, with the exception of more or less loss of sexual desire and power; but usually he is pale, thin, anemic, weak, perhaps with tubercular deposits in his lungs or elsewhere.

Course and Prognosis

The usual course of the disease has been described above. It is that of a local malady advancing slowly to a fatal termination. When, however, the patient's surroundings are unfavourable and his general health poor, he may succumb rapidly to the local disease. Indeed, we occasionally meet with a case which starts like an ordinary acute epididymitis, the *tuberculose galopante du testicule* of Duplay, and never remits its fury. In other cases, the chronic course of the disease is interrupted by acute exacerbations.

Although the testicular lesion is not always the most important feature of the disease, yet its progress affords a fair index for prognosis. If this can be controlled and the patient made to gain weight, the prognosis is good; if the testicle cannot be controlled and the patient loses weight, it is bad.

Under proper treatment I have known many patients to become and remain well. Others I have known to go on from one tubercular manifestation to another for an indefinite period. Thus, one patient whom I have seen recently has been ill since 1891, when the left epididymis and vesicle, and the left half of the prostate became manifestly tubercular. I removed his epididymis, and during the next two years twice cut down on and scraped a tubercular rib. In 1894 I scraped out an abscess in the opposite epididymis. At this time the right epididymis and right half of the prostate were most involved, and there was pain in the right loin, relieved by gushes of pus in the urine, showing that the disease had reached his right kidney. In 1898 he returned, his kidney still lame, but his general health unimpaired, and I incised and drained a tubercular tenosynovitis in his right wrist. At present both kidneys are, apparently, involved, but he still enjoys excellent health. The genitals are sound. So are wrist and rib. His lungs have never been touched by the dis-

ease. This result has been achieved by strict attention to hygiene and residence for several months during each year in a high dry climate. Other men I have known to conquer their disease while remaining here in New York amid highly unhygienic surroundings, and others again to fail in spite of all that surgery or medicine can do to help them. The more I see of tuberculosis the more I believe that, like syphilis, it can often be cured, but may relapse in the best of cases; that, again like syphilis, it is never a local disease and can never be lopped off; and that, once more like syphilis, the very best chance of a cure is obtained by a prolonged course of appropriate treatment in the early stages of the disease.

Death is usually due to tuberculosis of the kidneys or the lungs.

Diagnosis.—(See table on p. 752.)

Treatment

I believe that most surgeons in this country encourage immediate castration for every phase of tubercular testis, except, perhaps, the very earliest, or when bilateral disease is present. Thus Senn:[1] "Castration must therefore be regarded as the normal procedure in cases of uncomplicated, unilateral, tubercular epididymitis."

The more conservative views expressed by Bryson[2] ("Surgical measures should be held as a last resort"), Murphy,[3] and White, and Martin are, I believe, not received with any general favour.

It is impossible to review every phase of the question with impartiality, since no two surgeons exactly agree upon the indications for treatment. An excellent view of the subject may be obtained from the recent discussion before the Paris Surgical Society,[4] in which 16 of the leading French surgeons expressed their views on the subject. On only one point were all agreed—namely, that complete castration is rarely, if ever, permissible. Of the 16 only 2 stood out for immediate castration when the disease is unilateral, and only 2 others insisted upon complete removal of all local foci, with castration, if necessary to attain that end. Félizet employs castration for the virulent tubercular epididymo-orchitis of children when the child is cachectic and the testicle the only organ seriously diseased. He even sacrifices both testicles. Tuffier recognises only (1) hypertrophic tubercular orchitis (the hyperacute form) and (2) extensive suppuration as indications for castration. Bazy accepts only the latter.

[1] *Op. cit.*, p. 74.

[2] Morrow's System, 1893, i, 873.

[3] J. of the Am. Med. Ass'n, 1900, xxxv, 1189, 1276, 1346, 1407, and 1478.

[4] *Cf.* also Longuet's exhaustive review, Revue de chir., 1900, xxi, 79; Guyon's Annales, 1900, xviii, 961, 1066.

I array myself among the most conservative. I believe that the removal of one testicle tends, if anything, to encourage recurrence on the opposite side. While I am not absolutely convinced as to the physical effect of removing one testicle, I know of few worse moral effects than that produced by relapse on the opposite side after such an operation. I have not seen any generalization of the disease immediately after operation, such as some surgeons have reported; but, nevertheless, I am perfectly confident that the knife never removes all the disease, even when the entire tubercular testis with its cord and vesicle is taken away. All that the knife can do is to remove the most active focus of the disease, and this is best accomplished by conservative surgery, not by radical measures. When the inflammation does not subside under hygienic treatment, the surgical requirements of the case may usually be met by epididymectomy or by incision of suppurating foci.

On the other hand, I have seen every form of tubercular disease bettered and permanently cured by hygienic and dietetic measures, and these should always be accorded precedence, if for no other reason, at least because of the uncertainty of the disease. No two cases act alike. I have seen a most violent *tuberculose galopante* become almost well after a six-months' course of creosote, and a carbolic-injection cure of hydrocele, although all the while the patient was pursuing his profession of dentistry through the hot summer months on the East Side of New York.

To speak practically, the patient with a tubercular testicle should wear a suspensory bandage. He should be encouraged to take every advantage of sunlight and climate that his station in life permits. He should be treated with general tonics and antitubercular remedies according to the surgeon's judgment. Local remedies are useless. The injection of an iodoform glycerin emulsion (Senn) or of a 10% chlorid-of-zinc solution (Lannelongue) has met with little favour.

Epididymectomy should be performed if the disease grows worse in spite of palliative treatment. When any of the tubercular lesions soften or begin to adhere to the skin they should be opened and scraped at once. The surgeon may take this opportunity to lay open other points of threatening suppuration, or he may shell off the entire epididymis from the testicle, dividing the vas at or near the external abdominal ring. If the vas is involved beyond this point, the incision may be prolonged upward and outward over the inguinal canal, and the vas freed and followed down to the vesicle, where it may be divided. (See Castration.) If the abscess involves the testicle I like to burn its walls with the Paquelin cautery.

I accept only two indications for castration, the destruction of

the testicle by suppuration, and, in some cases, the hyperacute, galloping tubercular orchitis (usually due to a mixed infection).

All operations should be performed under general anesthesia, in order that the surgeon may have the opportunity to do his work thoroughly, unhampered by the patient's outcry. When epididymectomy is performed primary union may often be expected. Curetting and cauterizing operations should be terminated by drainage. Fungus may be amputated by the cautery, turned in and covered by the scrotum. If this operation fails castration is necessary. Pousson [1] has recently advocated ligature of the spermatic cord as a cure for tubercular testis. The suggestion is too new to receive calm judgment.

If the seminal vesicle is tubercular the question of operating upon it may arise (p. 788).

[1] Guyon's Annales, 1900, xviii, 356.

CHAPTER X

SYPHILIS OF THE TESTICLE—FUNGUS

There is no disease of the testicle so persistently misunderstood as syphilis. It is habitually mistaken for tubercle and cancer, and more than usually fortunate is that patient whose physician gives antisyphilitic medication the opportunity of making the diagnosis for him. Yet the syphilitic testicle presents quite as characteristic a symptom-complex as does tubercle or cancer, and, while less common than the former, it occurs far more often than the latter.

There are two forms of syphilitic testis: an epididymitis of the secondary period, and an epididymo-orchitis of the tertiary period.

SECONDARY EPIDIDYMITIS

This affection is insignificant. It occurs in connection with other secondary symptoms, and, as it consists merely of a nodule often quite painless in one or both testicles—usually both—it is but rarely discovered. Dron [1] has left a classical account of it. The general coexistence of other secondary symptoms suggests its nature, and it reacts kindly to routine mercurial treatment.

TERTIARY LESIONS

The lesions of tertiary syphilis in the testicle are entitled orchitis. But the epididymis also may be implicated. This involvement has been noted in a desultory way by many authors; yet no one seems ever to have been struck by its frequency and its pathognomonic features. But of these anon.

Morbid Anatomy.—*a. The diffuse form*, like interstitial hepatitis, or nephritis, is an interstitial orchitis, a peculiar sort of chronic inflammation attacking the fibrous envelope and the septa of the organ. Ricord named it albuginitis. The process begins by hyperemia;

[1] Archiv. gén. de méd., 1863, ii, 513 and 724.