a common feature of lymph scrotum (p. 698) and is caused by the rupture of a dilated lymph vessel into the tunica vaginalis. Filarial embryos have been seen in the fluid by Martin [1] and Davies.[2] Chylocele may also be due to traumatic rupture of a lymphatic into the tunica vaginalis. False chylocele is due to a fat- or cholesterin-producing degeneration in the fluid or in the epithelium of a hydrocele.

Chylocele when occurring without lymph scrotum resembles hematocele. The treatment is the same.

[1] Annals of Surgery, 1888, viii, 321. [2] Brit. Med. J., 1885, i, 1245.

CHAPTER XIII

DISEASES OF THE VAS DEFERENS AND SPERMATIC CORD

ANATOMY

The *cord* is made up of the vas deferens, the habenula or remains of the funicular process of the peritoneum, and certain vessels and nerves, all held together by meshes of connective tissue containing unstriped muscular fibre (internal cremaster of Henle). Surrounding these is a continuous layer of connective tissue (tunica vaginalis communis) adherent to the tunica vaginalis below and continuous with the fascia transversalis above. Outside of this the cremaster muscle lies in loops, some of them embracing the testicle in a fan shape, others extending only a short distance down the cord.

The *arteries* are, the spermatic from the aorta, the deferential from the superior vesical, and the cremasteric from the epigastric. The *veins* from the testicle and epididymis unite in the *pampiniform plexus* which constitutes the bulk of the cord. The larger veins have valves; they usually unite to form one large trunk, which empties, on the left side into the renal vein, on the right side into the ascending cava. The spermatic plexus of *nerves* is derived from the renal, the aortic, the superior mesenteric, the hypogastric, and the lumbar plexuses of the sympathetic, the genital branch of genito-crural nerve supplying the cremaster and the inguinal branch of ilio-inguinal.

The *cremaster* muscle varies in size and power in different subjects; it is a voluntary muscle; most persons can exercise it on both sides simultaneously, drawing up and holding the testicles against the abdomen; occasionally the muscles can be exercised separately, one testicle being elevated while the other is lowered. The function of the muscle is to assist in sustaining the testicle by its tonic contraction, and to compress the organ during the sexual orgasm. The muscle is subject to painful spasmodic contraction in kidney colic, in neuralgia of the testicle, and sometimes in connection with prostatic or urethral irritation. The *cremasteric reflex* is the retraction of the testicle caused by irritation of the adjoining portion of the thigh.

The Vas.—The vas deferens is the excretory duct of the testicle. It runs upward from the tail of the epididymis to form one of the chief constituents of the spermatic cord. It lies in the inner and posterior portion of the cord, where it may be identified as a rigid tube, the only element of the cord that does not slip almost insensibly from between the examining fingers. After passing through the inguinal canal the vas curves obliquely downward and backward over the base of the bladder, crosses behind the ureter and runs to the inner side of that duct, separated from it by the seminal vesicle. At this point it becomes markedly sacculated, then narrows to its original dimensions, and is joined by the duct of the seminal vesicle to form the *ejaculatory duct*, which pierces the prostate and opens into the posterior urethra just in front and to one side of the verumontanum.

The vas deferens is lined throughout with columnar epithelium. Its muscular coat consists of two layers, the inner circular, the outer longitudinal. Surrounding all is a dense fibrous tissue.

Relations.—The chief relations of the vas have been described above. In the scrotum it is closely surrounded by its own artery and one or two small veins. These vessels and the nerves run near it, and, except for a few veins to the inner side, the whole pampiniform plexus lies to its outer side.

ANOMALIES

Curling [1] relates a number of cases reported by various authors, in which the vas deferens was absent wholly or in part, on one or both sides. When the testicular end is missing the epididymis seems always to be wanting.

INJURIES

Wounds.—Wounds of the cord may cause profuse hemorrhage and rupture of the vas. The hemorrhage may be checked readily enough. If the vas is cut it should be united by Van Hook's method of ureteral anastomosis (p. 491). If some such operation is not performed, the duct becomes occluded, and, although this does not cause atrophy of the testicle, yet it shuts off the spermatozoa of that side from the urethra.

Complete division of the cord causes atrophy or gangrene of the testicle. Division of the pampiniform plexus causes only a temporary edema.

Torsion of the Cord.—(See p. 714.)

[1] Diseases of the Testis, 4th Ed., 1878, p. 7.

INFLAMMATION

Inflammation of the vas is usually incident to gonorrheal or tubercular epididymitis. It is rarely of any importance, unless an abscess forms. If this occurs in the scrotal portion of the duct it may be incised, if in the pelvic portion its existence is unsuspected, and it has been known to result in a fatal peritonitis.

Hydrocele and Hematocele.—(See p. 766.)

VARICOCELE

Varicocele may be either symptomatic or spontaneous.

Symptomatic Varicocele

Symptomatic varicocele is rare. This is caused by the pressure of some intra-abdominal growth obstructing the spermatic veins. The tumour is usually of renal origin and malignant. As Guyon, the original observer, remarks, the varicocele does not develop until the tumour of the kidney has become plainly palpable, so that symptomatic varicocele is not a very early sign of new growths of the kidney. Indeed Legueu [1] has shown that the veins are obstructed, not by the tumour itself, but by the enlarged glands along the renal vessels. Hence the varicocele is symptomatic of glandular enlargement, which argues ill for the ultimate results of any operation. Legrain [2] has once observed a varicocele symptomatic of gumma of the kidney.

Diagnosis.—Symptomatic varicocele cannot be mistaken for spontaneous varicocele. It develops very rapidly, late in life, on either side; is painless, attains a large size, and is always associated with a palpable abdominal tumour, against which the treatment should be directed.

Spontaneous Varicocele

Varicocele is a varicose enlargement of the pampiniform plexus and veins of the spermatic cord (Fig. 173). In a mild form, it is perhaps the most common affection of the genital organs. It has been estimated that about 10% of males have slight varicocele.[3] It occurs almost invariably on the left side; when very marked on this side it may exist slightly on the right, but varicocele of the right side is almost unknown. Pott met with it only once on both sides. Breschet,

[1] La presse méd., 1895, iii, 321; J. des practiciens, 1897, xi, 731.

[2] Guyon's Annales, 1898, xvi, 1155.

[3] Bennett estimates 7%, while Senn states that among 9,815 recruits 2,075 were affected with varicocele.

in 120 operations, operated only once on the right side. I have operated on both sides several times.

Slight turgescence of the veins of the cord does not deserve to be called a disease. The chief factor in its production is ungratified sexual desire, unrelieved erotic fancies, or, less often, the opposite condition, abuse of the sexual powers, by which the veins are kept constantly engorged. Most slight varicoceles are encountered in young unmarried men; the affection rarely commences after twenty-five; it is unusual to find it in a married man whose sexual relations are satisfactory. The slight turgescence of the veins constituting varicocele in a young bachelor and often causing him incessant and needless alarm, disappears after marriage, together with the uneasy sensations which accompanied it.

Old men whose testicles are inactive rarely have varicocele, though their legs show many tortuous veins and their tissues be degenerating. This fact is of the utmost importance, and is dwelt upon thus early in the consideration of the disease in order that attention may be specially directed to it. The idea that slight varicocele is often a sexual derangement, a functional disorder depending upon vicious sexual hygiene, is not emphasized by text-books, and is rarely appreciated by practitioners. In many cases young men distress themselves unceasingly, and importune their surgeons for an operation to cure a disorder which would be more speedily and effectually removed by marriage.

The degree of varicocele alluded to above may be dismissed briefly. It is found upon the left side; the vessels are a little full, the cord loose, feeling like a small bundle of earthworms, no one vessel being exceptionally large; the testicle is perhaps oversensitive (irritable), and there is usually a slight dragging sensation in the groin, but beyond this nothing except the fancied ills and the hypochondriacal complainings of the young man who is cheating Nature or abusing her gifts. The proper treatment of such cases is found in the employment of all hygienic and tonic measures. The patient's mind must be diverted, he must be dissuaded from an operation, told to wear a snugly fitting suspensory bandage, and if possible to forget his sex until marriage affords him an opportunity to get well. The free local application of cold water daily is a very useful adjuvant.

Yet varicocele serious enough to constitute a disease and to demand active surgical measures for its relief does occur. It is an exaggeration of the milder form; it comes on in early manhood, and has no connection with varices of the legs or anus (hemorrhoids). It is found on the left side, rarely on the right.

Pathogenesis.—Any theory to be adequate must explain the prevalence of the disease among the adolescent and its occurrence, almost entirely, upon the left side.

Many authors look for an anatomical predisposing cause. Thus certain French writers invoke a pre-existing phlebitis. Bennett [1] and Spenser [2] suppose a congenital anomaly of the veins. Such predisposing causes are not generally accepted. Sufficient anatomical predisposition is found in the position of the veins, dependent, unsupported, surrounded by the loosest kind of a fascial envelope. To this add the continual congestion set up by the untamed and pampered passions of youth, and no further predisposing cause is necessary.

But why should the varicocele occur upon the left side? To answer this question an infinite variety of theories has been proposed. There is space to enumerate only the more important ones. The left testis hangs lower than the right, and the left renal vein is higher than the opening in the cava which receives the right spermatic vein, hence the left vein is longer than the right. To this add the fact that the left spermatic vein, entering the renal vein at right angles, is not affected by suction as is the right vein which enters the cava at an acute angle. So far we are on safe anatomical ground; beyond all is theory. Perhaps, as has been alleged, right-handed men transmit the force of their exertions to the left foot by means of the abdominal muscles of the left side. But I have seen left-handed men with varicocele, always on the left side. Perhaps the sigmoid flexure, overloaded with feces, presses upon the veins. But this is as rare in youth when varicocele is common, as it is common in old age when varicocele does not occur. Curiously enough the ovarian veins are very rarely varicose, except on the left side.

A violent strain may induce acute varicocele.

Morbid Anatomy.—In mild cases the veins are merely tortuous and dilated. But in a full-formed varicocele the vessels are elongated, their valves broken down, their walls affected by fatty atrophy, and thickened, as is also the surrounding connective tissue. The veins sometimes contain phleboliths.

Symptoms.—I have seen a number of cases of *acute varicocele* resulting from straining, or coming on spontaneously. I have never seen it terminate otherwise than in recovery, under a suspensory bandage, a mild anodyne and a laxative. I have seen it last a number of weeks, and occasionally leave slight permanent enlargement of the veins of the cord.

[1] On Varicocele, London, 1891.

[2] St. Barthol. Hosp Rep., 1887, p. 137.