earlier cases seen by Dr. Van Buren and myself. None of the later cases examined was diabetic, so far as I know. Some of them had the gouty diathesis, but this cannot be affirmed of all. Tuffier,[1] in an exhaustive article, while omitting a number of cases of which I have record, has collected 35 cases, in which no diathesis is noted in 9, 15 were gouty, and 11 diabetic. The malady being far more common in advanced life than at any other time, he searched patiently among 2,500 old men at Bicêtre and Ivry without finding a single case, and mentions Cruveilhier and Ricord as having been equally unsuccessful in trying to find a case for dissection; but, after his article was finished, one of these nodosities was cut out by Verneuil (October 25, 1884), and Leloir reported that it was composed of a tissue analogous to that of keloids—embryonic cells in clusters tending to fibrous transformation, few vessels, with fibrous planes resembling cicatricial tissue.

Tuffier and Claude [2] report one specimen as a chondrofibroma of the sheath of the corpora cavernosa. Chetwood's case of osteoma of the penis proved to be in part fibroma, in part true osteoma.

From these scant records and the clinical data it may be definitely asserted that this condition is a fibrosis beginning in the sheath of the erectile bodies, tending to extend to the erectile tissue, and perhaps occasionally progressing to chondrification — very much more rarely to ossification. A distinction that may be made between these patches and true enchondroma and osteoma is that, while the former may diminish in size and disappear in one place while growing in another, the latter never undergo these retrograde changes.

Prognosis.—The prognosis is negatively good in that the fibrous mass never ulcerates or degenerates into anything malignant, may get spontaneously better, even possibly well, or may, and sometimes does, develop backward until it gets so low down towards the root of the penis that it no longer seriously interferes with upright erection. I have seen more than one patient who, at one time being debarred from sexual intercourse, has by a shifting of the position of the induration again become potent. I have met one person with a distinct softish plaque of some size, of which he had no knowledge whatever until I called his attention to it. The distinction between fibroma and enchondroma can only be made pathologically; clinically it is unimportant. The tendency to ossification manifests itself so rarely that it is a negligible quantity.

Treatment.—An effective treatment of this singular malady is yet to be discovered. Thus far time only has seemed to help it, while

[1] Guyon's Annales, 1885, July and August. [2] *Ibid.*, 1894, xii, 838.

blisters, oleate of mercury, tincture of iodin, with mercury, the iodids, and electrolysis, have uniformly failed. Perhaps alkalin or anti-gouty remedies may have some beneficial effect. I always try them, and have thought they encouraged resolution in some cases. Yet in others they are absolutely inefficacious. Excision only replaces the fibrosis by scar tissue.

Calcification and Ossification.—Both of these conditions are usually, probably always, secondary to fibrosis, or enchondrosis of the erectile bodies. Calcification of small patches is quite rare, ossification is even more unusual. Cases of this latter condition have been reported by von Lenhossek,[1] Demarquay,[2] Porter,[3] Jacobson,[4] and Chetwood.[5] In Chetwood's specimen certain spots were simply fibrous, others were cartilaginous, while the bulk of the growth was true bone. Most of these specimens, whether calcified or ossified, if carefully examined, would probably show some trace of these different stages of development. To compare penile osteoma with the bony development normal in the penes of certain monkeys is scarcely logical.

Prognosis.—Calcification or ossification may cease after more or less of each corpus cavernosum has suffered, or it may involve the whole organ pretty generally. The hard masses can be distinctly felt. Sexual intercourse may be seriously interfered with, if not prevented altogether. Under these circumstances the patient is often driven to thoughts of suicide, urged on by that morbid depression, which, in the male, always accompanies a sense of sexual incapacity, be that incapacity fancied or real.

Treatment.—Medicine holds out no hope to the sufferer. If the disease has come to a standstill and the deposit is superficial and small, it may be removed with the knife—an operation which has been performed with success by Regnoli, MacClellan,[6] myself, and others.

MALIGNANT NEOPLASMS OF THE PENIS

The primary malignant new growths of the penis are *sarcoma* and *epithelioma*. The former is very rare. It arises from the erectile bodies, usually the corpora cavernosa. The latter, much more common, begins on the glans, on the prepuce, or in the urethra. Epithelioma of the urethra will be considered with the other diseases of that canal.

[1] Virchow's Archiv, 1874, lx, i. [2] *Op. cit.*, p. 354.
[3] N. Y. Med. Record, 1882, 270. [4] *Op. cit.*, p. 683.
[5] J. of Cut. and Gen.-Urin. Dis., 1899, xvii, 231.
[6] Velpeau. Nouveaux éléments de méd. opért., 1839, iv, 336.

Secondary new growths present no peculiar features. They either form part of a disseminated carcinosis or are mere extensions of the tumour from an adjoining region, usually the scrotum.

Sarcoma

With or without previous trauma a tumour appears in one of the erectile bodies. The fact that it is a distinct lump and not a flat indurated patch readily distinguishes it from the benign tumours of these structures. Moreover, sarcoma usually appears in early manhood and develops with characteristic rapidity and early involvement of the inguinal glands. Exceptionally, however, it grows slowly and the glandular involvement occurs late. Of the 13 cases recorded by Jacobson [1] some arose from the erectile tissue, some from the fibrous sheath, and one—a melanotic sarcoma—apparently originated in the urethral mucous membrane. The earlier cases were reported as fibroma or carcinoma. As the tumour grows it causes priapism by occluding the cavernous spaces, and may also occlude the urethra and so cause retention of urine. Early amputation of the penis is the only *treatment*. The *prognosis* is absolutely bad.

Epithelioma

Epithelioma of the penis (Fig. 161) begins on the prepuce or glans, both of which are usually involved when the patient presents himself for examination.

Etiology.—Though Freyer [2] has reported a case in a youth of seventeen, and Kaufmann places 6% of the cases in the third decade, here, as elsewhere, epithelioma is usually a disease of later life. One case developed in the scar of a horse-bite, others have arisen from the scars left by venereal sores, a few from urethral fistula; but warts and chronic balanitis are the most fruitful sources of epithelioma, the former especially if neglected and allowed to remain foul and moist. Indeed, 29 of the 33 cases collected by Kaufmann began as apparently benign warts. Finally, phimosis is a marked predisposing cause of epithelioma. By retention of the smegma and urine it predisposes the patient to balanitis, vegetations, and fissures of the foreskin, and these processes once set up are kept concealed and constantly bathed in an acrid and irritating fluid. Demarquay noted phimosis in 42 out of 59 cases, and it is claimed that the circumcised Jew is exempt from penile epithelioma. The question of inoculation from the cervix uteri is agitated from time to time, but the

[1] *Op. cit.*, p. 738.

[2] Brit. Med. J., 1891, i, 1173.

extreme rarity of the cases adduced indicates that they represent nothing more than a curious coincidence.

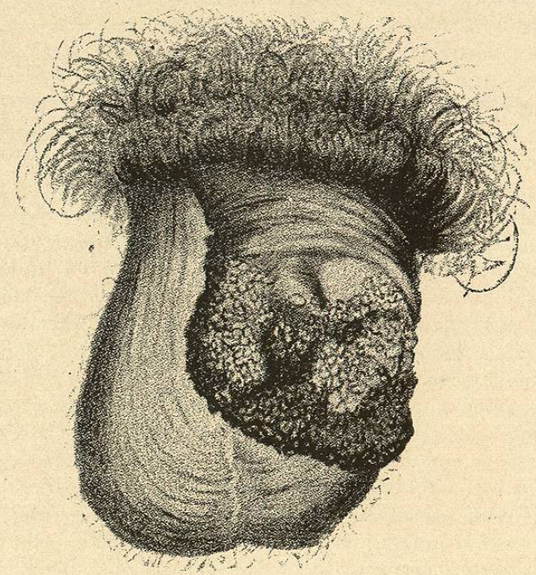

Fig. 161.—Epithelioma of the Penis.

Symptoms and Course.—Although epithelioma of the penis is not often seen until well under way and absolutely characteristic, the various aspects under which it first presents itself must be appreciated in order that intelligent radical treatment may be resorted to at once.

In about 5 out of 6 cases the disease begins as a wart situated on the glans or on the inner surface of the prepuce. This wart is intractable to ordinary methods of treatment, and recurs if cut or burned away. As it grows it assumes a lobulated, cauliflower appearance, and soon begins to ulcerate in places, and to exude the characteristic foul ichorous discharge. Then the base gradually takes on the hard induration of the epitheliomatous ulcer with everted edges. By this time the inguinal glands are probably involved and may be felt as shotty subcutaneous nodules in either groin. (For the lymphatics of the penis so anastomose that a so-called crossed bubo—the sore on the one side of the penis and the bubo in the opposite groin—occurs not infrequently.)

More rarely epithelioma begins as a raw spot or an indolent

ulcer, and still more rarely it appears first as a subcutaneous nodule or pimple which later ulcerates and assumes a warty growth.

In whatever way the disease begins, it comes after a time to the frankly cancerous stage. The ulcer advances, involving all the tissues in its path; the discharge is thin, sanious, fetid; the ulcer deep, irregular, unhealthy, its edges hard, livid, and coated. At the same time the exuberant warty growth progresses, either of these conditions predominating to make the case clinically a warty or an ulcerative lesion.

The inguinal glands now become prominent and partake of the pyogenic as well as of the cancerous infection, so that they become matted together, and may even go on to abscess formation, ulceration, and the production of an epitheliomatous ulcer in the groin.

Locally the growth may spread over quite a large superficial area without involving the corpora cavernosa, whose sheaths stoutly resist invasion, while it has frequently been noted that, though the entire glans may be involved in the disease, the corpus spongiosum is usually spared and urination is unimpeded. If, however, the canal does become obstructed, the urine usually manages to find its way through one or more fistulous openings in the floor of the urethra.

Lancinating pain is a prominent symptom only late in the disease. The chief inconveniences to the patient in the earlier stages are the presence of the growth, the foul discharge, and the tendency to annoying hemorrhage after the slightest abrasion. As the disease advances the strength of the patient fails. The tumour spreads up over the penis to the pubes, abdomen, and thighs, joining the ulcerated inguinal glands and extending down over the scrotum to the perineum, anus, and buttocks, until, finally, the patient dies of sepsis, cachexia, or hemorrhage. Curiously enough, lymphatic infection seems to stop for a long while at the inguinal glands, so that visceral metastases are the exception.

Diagnosis.—The diseases which may be confused with epithelioma of the penis are warts, chancre, chancroid, tubercular ulcers, and ulcers from chronic balanoposthitis.

As we have seen, the appearance of epithelioma is characteristic enough after its base has become indurated and the infection has begun to spread to the inguinal glands; but it is of the greatest importance that the diagnosis be made before that time, while the disease is yet eminently curable. To this end all growths or ulcers that prove intractable should be regarded with suspicion, and if that suspicion is confirmed by microscopical examination of a snipping from the diseased tissue, immediate operation should be insisted upon.

Prognosis.—Before the inguinal glands become involved the prognosis is good. Afterward it is bad, yet not absolutely so, for cures are reported in cases where unmistakable gland involvement had occurred. Thus Küttner[1] found a mortality of only 40.5% in 58 cases reported from three to twenty-nine years after operation. Indeed, in a few cases, slight glandular enlargements have been known to disappear permanently upon removal of the original focus of infection, as though the adenitis were purely inflammatory.

It is true the glands can and should be removed with the tumour, yet, in spite of the fact that infection is slow to pass them, the situation of these organs about the saphenous opening in the fascia lata, in close proximity to the great vessels, and the accompanying simple inflammation that usually mats the glands to one another and to the vessels themselves, render their removal an extremely delicate task and one of whose thoroughness the surgeon cannot always feel assured.

Treatment.—If the growth be seen before induration has occurred it may usually be removed by circumcision if on the prepuce, or by thorough cauterization if upon the glans. The patient should, however, be warned of the danger of recurrence, and should this appear, or should there be already some induration about the base of the tumour, the penis must be amputated behind the corona, and the inguinal glands of both sides extirpated, whether they are palpably enlarged or not, for the microscope has repeatedly shown these glands to be the seat of malignant deposits though their gross appearance was quite normal.

If the glans is extensively involved, the penis must be amputated close up to the pubes, or else extirpated entirely. Jacobson claims that simultaneous castration adds to the comfort of these patients, though most men refuse to part with their testicles even when their function has thus ceased.

Even though the disease has progressed still further, the ingenious surgeon will devise some irregular plastic operation which can be combined with complete extirpation to suit the exigencies of the case. The hope of cure may be slight indeed, but by vigorously attacking every outburst of the disease the surgeon may hope to prolong life for months or years and to render the sufferer at least fairly comfortable during that period. The various escharotics, the actual cautery, permanganate of potash and peroxid of hydrogen are of no small service in this terminal stage of the disease. Occasionally an actual cure may even be obtained, as in Taylor's case

[1] St. Louis Courier of Medicine, 1899, xxi, 72.

of removal of an epithelioma which had existed for six years. The patient died of intercurrent disease ten years after the operation, having shown no recurrence.

The type operations for removal of the penis which have been referred to in the preceding pages are, partial removal or amputation of the penis, and complete removal or extirpation of the penis. Amputation by cautery or écraseur need be mentioned only to be condemned.

Amputation of the Penis

The preparation for operation consists in the usual general and local preparation as for any aseptic procedure. General anesthesia is necessary. With the patient on the table a rubber catheter or tube is clamped about the root of the penis. Taylor suggests the use of hare-lip pins to retain it in place. Ample skin-flaps (see below) are then cut and dissected back a full inch, after which the knife is inserted between the corpus spongiosum and the corpora cavernosa, and these bodies separated and amputated, the former being left 2 cm. longer than the latter. The elastic ligature is now removed. This step will be followed by violent hemorrhage, but by the time spurting points have been caught and tied the oozing will be readily controllable by pressure. Hemostasis having been thus effected, the urethra is split into two or more short flaps (see below) and these sutured with fine catgut to the skin. The wound is then dressed aseptically with the stump of the penis erect, and provision made for the passage of the urine, either by a retained catheter, or by sealing the wound with absorbent cotton or gauze applied with iodoform collodion.

If the penis is to be amputated close to the pubes, elastic pressure may have to be dispensed with, and in such cases it is advisable to make a small buttonhole in the perineum, through which the urethra is isolated and sutured to the skin just in front of the anus.

Flaps.—A circular skin incision was used by early operators, but flap operations are now in vogue as giving more accurate apposition of the skin edges and cleaner healing. Senn and Jacobson both use long dorsal and short ventral flaps. Jacobson makes his so long that the urethra is sutured to a perforation in its lower part. Others prefer lateral flaps.

The end of the urethra is split in order to avoid a stricture at the new meatus. Guitéras [1] denies the necessity of this. Ordinarily it is split into two flaps to be sutured to the skin-flaps. Dr. Davis,[2] of

[1] J. of Cut. and Gen.-Urin. Dis., 1898, xvi, 212.
[2] Univ. Med. Mag., 1896, ix, 264.

Philadelphia, suggests three urethral flaps, each cut to a point and sutured to the skin, divided circularly. Keller [1] advises that the stumps of the corpora cavernosa be sutured together end to end to prevent secondary hemorrhage. It would seem that subsequent erections might tear out these sutures, or at least give rise to considerable pain and tension.

After-treatment.—If the flaps are cut long, erections need not be feared. A light dressing held snugly in place by adhesive plaster should prevent oozing. Frequent change of dressing is necessary to prevent defilement of the wound by urine. The patient should be examined for stricture of the new meatus some weeks after healing is complete.

Extirpation of the Penis.—The patient is placed in the lithotomy position, and an elliptical incision is made around the base of the penis. The skin of the scrotum is incised along the entire length of the raphe. With the fingers and the handle of the scalpel the halves of the scrotum are then separated down to the corpus spongiosum, a full-sized sound is passed as far as the triangular ligament, and the knife inserted between the corpora cavernosa and the corpus spongiosum. The catheter having been withdrawn, the urethra is cut through just in front of the bulb and detached back to the triangular ligament. The suspensory ligament is then divided and the penis separated from the soft parts down to the attachments of the crura, and each crus separated from the pubic arch by means of a stout periosteal elevator. The edges of the incision in the scrotum are then brought together and the urethra split and stitched to the lower angle of the wound. Drainage is supplied by a tube placed deeply in the wound with its extremities protruding at the upper and lower angles. No catheter need be retained in the urethra. The operation is always protracted owing to the close and firm attachment of the crura to the bone and the excessive hemorrhage during their detachment. Four arteries—the two arteries of the corpora cavernosa and the two dorsal arteries—must be tied.

Total Emasculation.—The removal of the testicles adds little to the gravity of extirpation of the penis, and has been strongly urged as an essential part of that operation, on the ground that the testicles "remain ever after sad dumb witnesses of a function which is lost forever" (Montaz) or, in less poetical language, that castration in this case averts the hypochondriacal and maniacal tendency which in late years it has been said to cause when the operation is performed for the relief of prostatic hypertrophy. Pantalini [2] in

[1] Brüns, Beitrag zur. klin. Chir., iv, 235.
[2] Arch. prov. de chir., 1898.

particular argues the case well, confronting the hysterical tendencies of those who have preserved their testicles with the clearheadedness of the emasculated, and the certified strength of mind of Oriental eunuchs. Whether this be generally true or not, it is not amiss to consult the patient's wishes in the matter.

The operation itself is simple enough. The cord with its vessels and the pampiniform plexus of veins are tied off by separate ligatures on each side at the external abdominal ring, and cord, vessels, and testicles are removed through the scrotal incision. Pantalini has collected 23 cases without operative mortality, 3 deaths by recurrence within a year, and 1 cure after three years. The remaining 15 were reported cured at shorter intervals.

Extirpation of the Inguinal Glands.—As has been already remarked, it is wise to remove the inguinal glands even if they appear normal. This may be readily done through oblique incisions in each groin, extending upward and outward from the upper angle of the peripenile incision. As the danger point in this operation is the saphenous opening and the vessels immediately beneath and below it, this should be laid bare at once and the dissection of the glands carried upward from this point.

After-treatment.—The most comfortable dressing after extirpation of the penis or total emasculation is a heavy pad of gauze held in place by a double spica of the thigh or by two pieces of adhesive plaster crossed. The dressing must be changed daily, and so arranged that its lower end is easily elevated to permit catheterization and urination.

CHAPTER IV

DIAGNOSTIC TABLE OF PENILE CHANCRE, CHANCROID, HERPES, AND SIMPLE ULCERATION

The following table is intended to serve as a summary of the broad, classical characteristics of syphilitic chancre and chancroid, as well as for the differential diagnosis of syphilitic chancre, chancroid, herpes, and ulcerated abrasions; of the bubo of chancroid, and that of syphilis; and of the different forms of lymphangitis.

SYPHILITIC CHANCRE	CHANCROID	HERPES	ULCERATED (BALANITIC OR OTHER) ABRASION
1. *Nature.* — Always a constitutional affection.	1. Always a local disease.	1. Sometimes a local disease, sometimes a neurosis.	1. Always local.
2. *Cause.*—Sexual intercourse with a patient suffering from syphilitic chancre, or from some secondary syphilitic lesion of or near the genitals; vaccination with syphilitic blood; accidental or designed inoculation of any vehicle containing the syphilitic virus upon an abrasion of any portion of any tegumentary expansion.	2. Sexual intercourse with a patient suffering from chancroid of or near the genitals; accidental or designed inoculation with the secretion of chancroid or of virulent bubo. The specific bacillus may usually be isolated.	2. Mechanical irritation, friction, as in sexual intercourse; chemical irritation, as of acrid discharges. As a sequence of cold, fever, or as an essential neurosis.	2. All of the causes mentioned for herpes, except the last three.
3. *Situation.* — Usually upon or near the genitals, not very infrequent on the head, hands, or nipple.	3. Very rarely encountered except on or about the genitals.	3. Of very frequent occurrence upon the genitals.	3. Same.
4. *Incubation.* — Constant, not less than ten days, usually three weeks.	4. None after absorption of the poison. Ulcer usually fully formed on the second or third day; very rarely commences later than the seventh.	4. None.	4. None.