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# Pathology and treatment of gonorrhea

Albert Luppens
*University of Nebraska Medical Center*

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# THE PATHOLOGY AND TREATMENT OF GONORRHEA

By

Albert Luppens

A Senior Thesis presented to the University of Nebraska which is one of the requirements for the degree of Doctor of Medicine.

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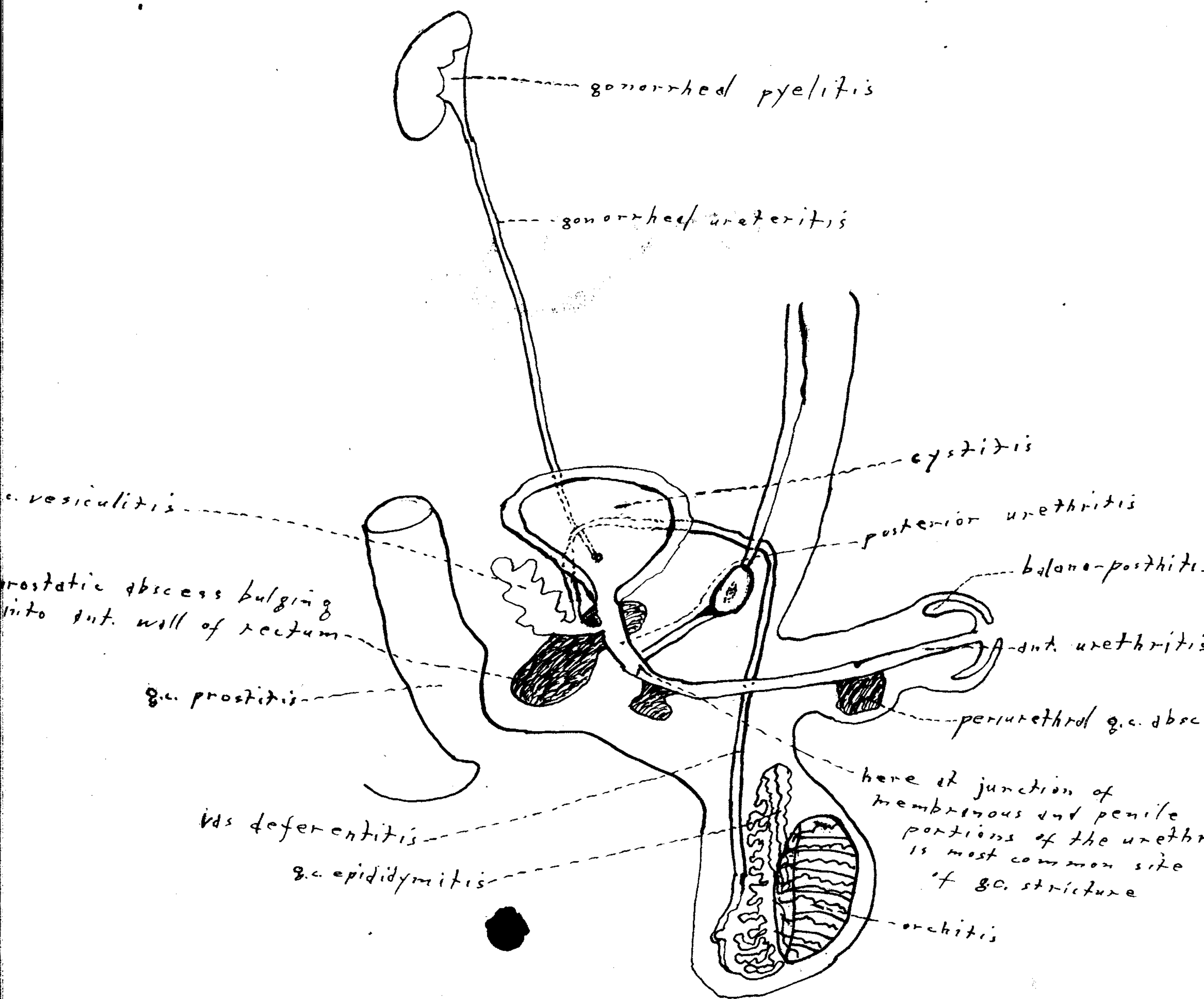
HISTORY

"1. And the Lord spake unto Moses and to Aaron, saying, 2. Speak unto the children of Israel, and say unto them, "When any man hath a running issue out of his flash, because of his issue he is unclean. 3. And this shall be his uncleanness in his issue: whether his flesh run with his issue, or his flesh be stopped from his issue, it is his uncleanness. 4. Every bed, whereon he lieth that hath the issue, is unclean: and everything, whereon he sitteth, shall be unclean." etc. etc. Before considering the pathology and treatment of gonorrhea it is interesting to note that infectious discharges from the genital organs of both sexes, must have been known in olden times, even in the remotest antiquity. There is an allusion to an "unclean seminal discharge" in the third book of Moses (Leviticus, chap. xv), and the sanitary regulations prescribed by Moses himself indicate conclusively the actual infectious nature of such seminal discharges. There is undisputable evidence which shows that the Chinese were acquainted with gonorrhea more than five thousand years ago which makes the Biblical story comparatively modern. Luys, probably the best known French Urologist,. is authority for the statement that circumcision was invented for the purpose of guarding against balanoposthitis, one of the most common complications of gonorrhea. Ircord, the famous French venereologist, facetiously expressed the generally accepted conviction that gonorrhea enjoys antiquity probably as old as Man.



gonorrheal pyelitis
gonorrheal ureteritis
cystitis
c. vesiculitis
posterior urethritis
balano-posthiti
rostatic abscess bulging
into ant. wall of rectum
ant. urethritis
g.c. prostitis
periurethral g.c. absc
here at junction of
membranous and penile
portions of the urethr
is most common site
of g.c. stricture
vas deferentitis
g.c. epididymitis
orchitis

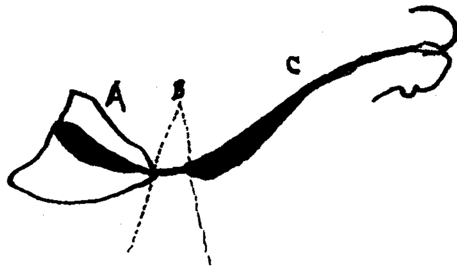



Fig. 1. Longitudinal section of the male urethra

A. Prostatic urethra
B. Membranous urethra
C. Anterior or penile urethra

<u>The Normal Anatomy of the Male Uro-Genital Tract</u>. Before considering the Pathology of Gonorrhea a brief consideration of the anatomy of the parts involved will probably be of value. The bladder, ureters and kidneys are not exempt from gonococcal infections, but this happens comparatively rarely and so therefore we will give less attention to these structures. First the urethra is seven to eight inches long and is divided anatomically and pathologically into an anterior and a posterior portion. The former extends from the external urinary meatus backward to the anterior layer of the triangular ligament; it is about five and a half or six inches long, and its caliber varies from 27 to 30 French, except at the meatus, which has an average normal caliber of 28 French. The posterior urethra extends from the anterior layer of the triangular ligament backward to the bladder. Its total length is about two inches and it is divided into two portions, known as the membranous and the prostatic portions, of the posterior urethra. The membranous urethra is that portion included between the anterior and posterior layers of the triangular ligament; it is from three-quarters to one inch in length, poorly vascular, and has an average caliber of 27 French. The slight vascularity of this part of the canal renders it perceptibly free from severe invasion by the gonococcus and subsequent stricture formation. The prostatic urethra adjoins the membranous portion and lies wholly within the prostate. It is also known as the bladder

neck, owing to its anatomic relationship to that viscus. The prostatic portion is slightly longer than the membranous, being from one to one and a quarter inches in length; its caliber approximates 33 French at the vesical end or base of the prostate, 45 French at its middle and 30 French at its junction with the membranous urethra, or apex of the prostate. In passing, it may be mentioned that the length of this portion of the urinary canal is of the highest importance in prostatic troubles, notably in the senile hypertrophy of that organ. By the increase in its length we are often enabled to estimate the amount of intraurethral impingement of the gland.

The glands and follicles of the urethra are of the highest importance. On its upper wall a number of mucous follicles or number of pockets or reduplications of the mucous membrane which are known as the crypts, or lacunae, of Morgagni. The largest of these, the lacuna magna, is the most constant and lies about three-quarters of an inch back of the meatus. The ease with which these glands become infected and the corresponding difficulty of ridding them of their inflammatory contents, make them highly important in the consideration of male gonorrhea.

Brief mention also should be made of Cowper's glands, situated one on each side of the membranous urethra and lying in the substance of the compressor urethrae muscle. These glands secrete a mucous fluid during the sexual orgasm, which is passed through a duct to the bulbous

portion of the urethra. They are sometimes attacked by the gonococcal infection and not infrequently require surgical interference.

The genital tract is of far greater importance than the urethral canal in the ultimate results of its infection by the gonococcus, owing to the difficulty of "getting at" the seat of infection and the consequent tendency to chronicity. It will be seen that any acute inflammation involving the prostate passes rapidly to the seminal vesicles and less frequently, to the epididymes. It is apparent, therefore, that if we can succeed in limiting the infection to the anterior urethra, or even to the superficial portions of the prostate, we can avoid the most serious complications of the disease.

The prostate is a glandulomuscular organ which is usually described as resembling a horse chestnut, lying between the rectum and symphysis pubis and connecting the membranous urethra with the bladder. Its function is quite uncertain, but recent studies demonstrate that its secretion is essential to the life and activity of the spermatozoa after they have left the testes. From apex to base it is tunneled by the urethra, which passes between its lobes and broadens at the prostatic base to empty into the bladder. The muscular fibers of the prostate completely encircle this portion of the urinary tract and by their tonic action help to keep the canal firmly

closed. The finger in the rectum usually will identify the deep depression or groove which separates the lateral lobes and forms the roof of the prostatic urethra. The floor contains numerous important structures, principally the verumontanum or colliculus, a structure of erectile tissue, richly supplied with nerves and thought to be the seat of pleasure in the sexual act. On either side are the numerous openings of the prostatic ducts; anteriorly, the openings of the two common ejaculatory ducts and on its summit, the sinus pocularis or homolog of the uterus or the so-called masculine uterus. Altogether the structure of the prostatic urethra offers the richest possible soil for the growth and permanent lodgment of the gonococcus and other bacteria.

The seminal vesicles are two conical pouches, connected with the vasa deferentia, lying on each side of the bladder and rectum. They serve not only as seminal reservoirs, but also activate the semen and expel it into the prostatic sinus immediately before the ejaculatory orgasm. Each vesicle actually is a single canal between 10 and 15 cm. in length, with diverticula, which double back on themselves, the whole forming an irregular pouch-like body. It is about 50 mm. long, 18 mm. wide and 10 mm. in thickness. When inflamed, these dimensions are considerably increased and the organs are easily palpable by the finger in the rectum. In the normal state they usually cannot be palpated. Within the prostate, each vesicle joins with

its corresponding vas deferens to form the common ejaculatory duct, one on each side. It is through the vasa deferentia that the spermatozoa are transported from the testes to the seminal vesicles for storage and expelled into the prostatic urethra through the ejaculatory ducts during the sexual orgasm or nocturnal seminal emission.

The vas deferens, leaving the common ejaculatory duct, joins the spermatic and cremasteric arteries, the artery of the vas, the pampiniform plexus of veins and a rich supply of nerves, to form the spermatic cord, reaching the testes by way of the epididymes. The epididymis is a crescent-shaped body fitting around the upper and posterior surface of the testis and is divided into a head (globus major), body and tail (globus minor). When the gonococcal infection is of a severe type, the vas and epididymis frequently are attacked and sometimes the testis proper also is involved.

The Mechanism of the Gonorrheal Infection. The external orifice of the male urethra during the act of coition, by the forcible intrusion of the membrum virile (erect penis) into the vagina, is mechanically slightly opened. By the separation of the lips a vacuum occurs, and by the laws governing such physical conditions a portion of the contagious fluid that happens to be in the vagina is sucked into the urethra and effectively retained there, because during the retraction of the organ that follows the lips of the meatus are closed again.

<u>The Course of Acute Gonorrhea</u>. Twenty-four or forty-eight hours, seldom later, after an act of intercourse, the person feels a slight, unpleasant prickling sensation at the meatus which leads him to micturate frequently. Gradually, however, the mucous membrane of the meatus becomes swollen and a slight but clear translucent and tenacious secretion makes its appearance, which, uncer the microscope, shows mucous corpuscles and a few epithelial cells. If the patient is made to pass his urine into a glass vessel, the discharge will be seen to contain numerous flocculent and thread-like structures that swim about in the urine, which is otherwise clear. The discharge being slight, it therefore becomes inspissated in the meatus, sealing it up, thus preventing the patient from micturating easily. It generally requires a few moments before the thickened discharge is washed away by the stream of urine. However, the scene is soon changed. The tickling is transformed into a burning, painful sensation. The mucous membrane of the meatus swells up so that it bulges outwardly and the orifice looks like the mouth of a fish. The secretion becomes more profuse, thicker, and acquires a greenish or yellowish-green color. If at this stage of the disease a small quantity of the urine is collected in a glass vessel, it will appear opaque on account of the purulent secretion that is mixed with it. The pus-corpuscles swim about like particles of dust or minute animalcules in the urine, and then gradually sink to the bottom of the vessel because their specific gravity is

greater then that of the mucous flakes and epithelial cells of the mucous catarrh and the urine itself. The discharge slightly colors blue litmus-paper red, and under the microscope shows predominantly pus-corpuscles along with mucous and epithelial cells, sometimes also a few blood-corpuscles. Virchow has called attention to the fact that gonorrheal pus-corpuscles are larger than those of ordinary pus. The purulent discharge appears by the fourth or fifth day, rarely not until the twelfth or fourteenth. As the discharge from the anterior part of the urethra gradually increases, the difficulties of urination also increase. The patient micturates either with a good deal of pain, the urine coming away only in drops, or in a thin, weak, and interrupted stream, because the urethra, owing to inflammatory swelling of the mucous membrane, is temporarily narrowed, and the smooth, striated, muscular fibers of the urethra that propel the stream of urine are partially paralyzed. Occasionally the sphincter vesicae contracts spasmodically, causing intense strangury. The spongy portion of the penis, like the mucous membrane, is engorged; hence the organ is constantly in a semi-erect condition, and thus helps to render the urethra still narrower.

The morbid phenomena here delineated persist for a longer or shorter period according to the dietary measures and regimen patient keeps. Under appropriate measures the swelling of the urethral canal/subsides by the eighth day, and the dysuria markedly diminishes.

At the beginning or end of the third week the purulent discharge decreases and becomes poorer in pus-corpuscles, while the mucous and epithelial cells begin to predominate. Gradually the mucous discharge also changes, so that only a few drops of mucus or muco-purulent discharge escapes from his urethra, if he has not micturated for several hours. If the urine that is passed at this time is collected in a glass vessel, whitish shreddy structures (gonorrheal shreds), varying in length, are seen floating in it. If the shreds are taken from the urine they will contract into small gelatinous lumps, and microscopically are seen to be fatty degenerated epithelial cells and pus corpuscles. These elongated epithelial shreds may form at any point of the urethral canal. After a while, the quantity of these shreds diminishes, and for some time, whenever the patient urinates, there may be but one such shred in the urine. Finally, this one too disappears, and in the course of six weeks time a gonorrheal process may be said to have reached its end. So long as any of these gonorrheal shreds is noticeable in the urine, the least cause may again start up the morbid process that is so near expiring. The oftener these relapses occur the more difficult it is to cure completely a urethral gonorrhea. In some parts of the mucous membrane of the urethra permanent sensitive spots remain, attended by persistent though slight muco-purulent discharge. This condition is called gleet.

Pathological Alterations in the Male Urethral Canal. During the life of the patient it is not possible to see throughout the whole extent of the urethra, with the unaided eye, the morbid alterations of the mucous membrane of the urethra. Examinations on the cadaver seldom offer an opportunity of studying the morbid alterations of the urethral mucous membrane; and the views of most reliable investigators, based upon post-mortem research, refer more to such morbid lesions which have originated in consequence of a protracted chronic gonorrhea than to alterations resulting from the acute form of the disease. The few cases of gonorrheal disease which have been investigated post-mortem, before the affection of the urethra had entirely disappeared, teaches that it only occasions such morbid changes as we are accustomed to fine in catarrhs of other mucous membranes. The pathological alterations of gonorrhea of the vaginal mucous membrane in the acute stage, or blennorrhagic affection of the conjunctiva palpebrarum et bulbi, will form the truest representation of the lesions resulting from the disease under consideration. We find there redness and swelling of the mucous membrane, sometimes granulations, and not infrequently erosions, which bleed easily. In regard to the gonorrheal discharge, in the acute stage of the disease, proliferation of the epithelial cells and transformation of the epithelium-cells into pus-corpuscles take place, while in the torpid stage epithelial cells undergo fatty degeneration and hyaline cells abound. Rokitansky

expresses himself thus: "The catarrhal inflammation of the urethral mucous membrane has a tendency to run a chronic course. It is either uniformly distributed over the entire urethra, or sometimes from the beginning, at other times later in its course, is limited to one or more spots. These inflamed spots are found at any parts as far as the prostatic portion, but most frequently at the fossa navicularis, and near the bulbous portion of the urethra. They are recognized by their dark-red color and the swelling of the mucous membrane; sometimes, especially in the fossa navicularis, remarkable enlargement of the mucous glands and purulent collections are observed. At the same time the corpus spongiosum urethra at the places mentioned, in its innermost layer--at times, indeed, throughout its entire length--is swelled, and its meshes diminished in size, and consequently contains less blood. At these places an unyielding swelling, produced in the manner described, is readily perceived along the urethral canal. The longer the inflammation lasts, especially when its intensity is frequently aggravated, the less likely is it to get well entirely, it is more apt to terminate in thickening of the mucous membrane, or strictures."

Acute Gonorrhea. In order to aid the natural process of repair, the first essential is rest. No other measure contributes so much to a prompt and uncomplicated recovery as rest in bed during the acute stage of gonorrhea. The

patient should, if possible, be put to bed and kept there during the acute stage from one to two weeks, or until the discharge becomes mucopurulent and the burning on urination has disappeared.

In order to keep the urine bland and unirritating and to promote frequent urination, so as to clear the urethra from the products of inflammation and to expel free organisms that may reinoculate new areas, the patient in bed should drink one glass of water every hour. The diet should be bland and of a low nitrogen content; highly seasoned and rich foods should be strictly excluded; cereals, fruit juices, toast and cream with a moderate amount of milk should make the bulk of the meals.

Alkalis and alkaline mineral waters should not be prescribed, because of their effect on the reaction of the urine. An acid reaction of the urine is the best safeguard against a cystitis from bacteria that find their way into the bladder. The acidity of the urine will be reduced sufficiently by the free use of milk and the abstinence from meat. The bowels should be kept open with aperients, and during the very acute stage a saline cathartic should be administered every other morning.

Dressings for the purpose of catching the urethral discharge to keep it from soiling the clothing always should be worn. A loose bag, made by cutting off the foot of a stocking, into the bottom of which gauze can be placed to catch the pus may be used. The bag is to be suspended from a waist band. The loose bags permit and encourage

a free flow of pus from the urethra, while they prevent retention. Constriction of the penis by dressings wrapped around it should carefully be avoided so as to insure no interference with the return circulation. A suspensory bandage should be worn when the patient is allowed to get, up, in order to relieve the sensation of dragging on the spermatic cord.

Severe Acute Urethritis. In very severe urethritis with intense reaction, profuse discharge, and great swelling and edema, it is good judment to wait for some subsidence of the symptoms before beginning injections. In the meantime the parts should be kept clean; the penis held in hot water for fifteen minutes at a time every few hours, and hot sitz baths given every three or four hours to relieve distress. If sitz baths are unobtainable, hot fomentations may be substituted. If pain on urination is very distressing, it may be relieved by an injection, five minutes before urination, of 1 c.c. of 1 per cent. solution of cocain hydochlorate or procain.

Local Treatment.--In the ascending stage of acute urethritis and in other acute cases, which do not reach the intensity suggested in the preceding paragraph, local treatment by injection may begin at once.

In selecting the drug used for injection, it is necessary to bear in mind the indications for its use, which may be thus formulated:

1. To destroy the gonococci in all foci within reach

as early and completely as possible.

2. In doing so, to avoid irritation of the mucous membrane any exacerbation of the existing inflammation and everything that has a caustic action on the tissues, and all unnecessary pain.

These indications are very well met by the silver protein compounds of the argyrol and protargol type. The syringe should be all glas, of 5 c.c. capacity, with a smooth acorn tip. For injection, fresh solutions in water of the following strengths are used: argyrol, from 3 to 5 per cent.; protargol, from 0.25 to 1 per cent. Before injecting, the urine should be passed so as to wash out the pus accumulated in the urethral canal. In making injections the tip of the syringe should be firmly pressed into the meatus, and the penis should be held under moderate tension. The solution should be injected with the utmost gentleness. It should be held in the urethra for at least five minutes. If injections produce distress their strength should be reduced. Injections should not be given frequently enough nor sufficiently concentrated to cause any irritation of the mucous membrane; an injection which is too often repeated or is too concentrated prolongs the course of the case. In practice it is found that once in two hours is sufficiently often to destroy the gonococci without damaging the inflamed mucous membrane, provided the injection is carefully given and the solution is not too strong.

<u>Subacute Anterior Urethritis.</u> After from ten days to three weeks in those cases that run a favorable course under the treatment with silver proteinates, the acute symptoms disappear. The discharge becomes watery and scant; microscopic examination reveals many newly formed desquamated epithelial cells and few or no gonococci; the urine in the first glass becomes clear or slightly turbid, although it contains many long mucous filaments. If treatment is now discontinued, relapse with extensive reinfection is certain to occur in from two to three weeks from the few gonococci left in the tissues. When the gonorrhea has reached this subacute stage, the task remains of curing the existing postgonorrheal lesions, which consist of catarrhal inflammation of the mucous membrane, erosions, periglandular infiltrations, and infiltrations of the submucous tissues. Since the silver proteinates only destroy the gonococci and have little effect on the inflammatory processes, it is necessary at this time to treat the existing catarrh of the mucous membrane with astringent remedies. At this point in the progress of the disease it is highly desirable to substitute copious irrigations of the urethra for the hand injections.

Irrigations.--The solution best adapted for the double purpose of destroying the few remaining gonococci and of acting as an astringent to cure the superficial postgonorrheal lesions of the mucous membrane is silver nitrate in strengths of from 1:3,000 to 1:5,000 of distilled water. Irrigation with silver nitrate solution acts particularly well in the presence of a clear urine

containing shreds of pus or mucous. It may be used every day or every other day. Potassium permanganate in water solution of the strengths of from 1:3,000 to 1:5,000 is also useful for irrigations. It is especially called for when there is a free purulent discharge containing no organisms and may be repeated three or four times daily, if it does not produce irritation. A purulent discharge that arises from the presence of a nongonococcic bacterial urethritis yields to daily irrigation with mercuric oxycyanid in soution in water in strengths of from 1:3,000 to 1:5,000. This should never be used if the patient is taking iodin in any form. The irrigations should be given at temperatures of from 110 to 115 F.--as hot as can comfortably be borne.

Technic of Irrigations.--The patient should sit well forward on the chair, resting his shoulders against its back, or he may stand. He should hold a small basin to catch the overflow of the irrigation. The irrigator tip is pressed against the meatus and the anterior urethra distended with fluid. Then by a short release of pressure of the tip a return flow is allowed. This is repeated until thorough irrigation of the anterior urethra has been obtained. If it is desired to irrigate the posterior urethra, the anterior urethra should first be wahed out. Then the tip should be firmly pressed against the meatus and the anterior urethra dilated with fluid. The

patient is then instructed to take a long breath and to try to urinate; this releases the cut-off muscle and the irrigating fluid flows into the bladder. The bladder is allowed to fill with fluid, but should not be distended beyong the point of comfort. After the bladder is filled, the patient empties it by urination. Should difficulty be experienced in irrigating the posterior urethra from the meatus, a soft rubber catheter may be introduced through the cut-off muscle into the posterior urethra and the bladder filled through the catheter. The patient then urinates after the catheter is removed.

Acute Posterior Urethritis. Posterior urethritis develops as a rule after acute anterior urethritis has become subacute, that is, from the second to fourth week of infection, or later. It occurs in about half of the cases of gonorrhea. Its occurrence is usually due to the spontaneous spread of the infection from the anterior urethra; but not infrequently the tendency to its spread is increased by too vigorous local treatment, particularly in injudicious instrumentation. It may occur as a very severe process, or more frequently as a subacute one. In addition to the urethra, it is likely to involve the prostate and the base of the bladder, and frequently it spreads to the seminal vesicles and the epididymis.

The onset of posterior urethritis will not escape detection, if the two-glass test is done daily as a routine measure. A turbidity of both glasses, when due to pus and not to phosphates, denotes involvement of the posterior

urethra. With this will occur frequent, painful urination.

Severe posterior urethritis demands complete rest in bed and measures directed to the relief of the distressing symptoms. All local treatment of the urethra should be suspended. The nearer the diet approaches to a liquid or milk diet, the better. Abundant water should be taken, but diuretics should not be used, because they cause the too frequent evacuation of an already overtaxed bladder. Saline cathartics should be given every other day to reduce congestion in the pelvis. For the relief of tenesmus and pain, hot sitz baths of half an hour's duration, repeated several times a day, are useful. Alkalies, which favor the growth of bacteria in the bladder by rending the urine alkaline, are contraindicated, as they are in acute urethritis. In the severe cases morphine should be given to relieve tenesmus and desire to urinate. It is best to give it in these cases in rectal suppositories.

As a rule, the acute stage of posterior urethritis disappears promptly, and the cases pass into the condition of mild posterior urethritis, and then should be treated as such.

Treatment of Mild Posterior Urethritis.--In subacute posterior urethritis, treatment is given on principles similar to those applicable to subacute anterior urethritis. Solutions are applied to the surface, either by the injection of small quantities of concentrated solutions

or by irrigations of copious quantities of dilute solutions.

In the first method, a small soft rubber catheter is introduced just beyond the cut-off muscle, by means of a small urethral syringe about ten drops of 1:5,000 to 1:100 solution of silver nitrate are introduced into the posterior urethra. This is to be repeated at intervals of one or two days according to the tolerance of the case. In order to prevent immediate precipitation of the silver by the urine, the injection should be made with the bladder empty.

Urethrovesical irrigations by the gravity method are particularly applicable to the treatment of posterior urethritis. They are given through a gravity irrigator elevated five to six feet above the penis, according to the technic already described for irrigation. For posterior irrigations, protargol or similar silver protein preparation in the strength of from 1:1,000 to 1:250, or silver nitrate from 1:10,000 to 1:4,000 are used. Less effective, but still useful in some cases, is potassium permanganate, 1:3,000.

As a rule, posterior urethritis extends to the prostate and seminal vesicles, and persistence depends on reinfection from these structures. In every case these structures should be examined and, if necessary, treated.

ANALYSIS OF POSSIBLE ETIOLOGIC FACTORS IN TWENTY-FIVE CASES OF GONORRHEAL URETHRITIS WITH COMPLICATIONS

| Case No. Name | Duration of Infection | Duration of Complication | Type of Complication | Possible Etiologic Factors as Elicted from Patien'ts History |
|---|---|---|---|---|
| 1. P.C. | 2 wks. | 2-3 ds. | Acute Prostatitis | Admitted coitus in presence of discharge. Was not warned by his doctor, and he thought that by means of a condom no ill effect could follow. Prostatitis developed 2 days after coitus. |
| 2. J.C. | 2 wks. | 1 wk. | Acute Epididymitis | Admitted coitus at height of infection, and treated himself immediately afterward with a "very strong" medicine which he himself prepared. Evidence of posterior involvement ocurred next day. |
| 3. J.F.W. | 4 wks. | 4 ds. | Acute Epididymitis | Admitted occupying same bed with wife while infection was at its height. Erotic effects followed. Not cautioned by his physician. |
| 4. D.Mc. | 8 wks. | 5 ds. | Acute Epididymitis | Went on alcoholic spree two days prior to onset of complication. Not warned by his doctor. |
| 5. D.B. | 4 wks. | 5 ds. | Acute Epididymitis | Three days before onset of epididymitis he went swimming and diving. Overdid it. Posterior involvement noted following day. Was not warned about danger of certain type of over-activity. |
| 6. G.H. | 2 Mos. | 12 ds. | Subacute Epididymitis | Two weeks ago his doctor changed the treatment, because the infection was persistent. He gave a deep injection with a strong medicine which burned strongly. That week the testicle swelled. |

ANALYSIS OF POSSIBLE ETIOLOGIC FACTORS IN TWENTY-FIVE CASES OF GONORRHEAL URETHRITIS WITH COMPLICATIONS (Cont'd)

| Case No. Name | Duration of Infection | Duration of Complication | Type of Complication | Possible Etiologic Factors as Elicted from Patient's History |
|---|---|---|---|---|
| 7. F.W. | 5 wks. | 3 ds. | Acute Epididymitis | Had intercourse 1 week ago. Was not warned. |
| 8. F.N. | 3 wks. | 1 wk. | Acute Prostatitis (Acute Epididymitis Later) | Sound passed by his doctor 9 days ago. Posterior involvement noted next day. |
| 9. C.E.B. | 5 wks. | 1 wk. | Acute Epididymitis<br>Acute Arthritis<br>Vesiculitis | His physician passed a catheter daily and irrigated the urethra. Posterior Urethritis developed almost at the beginning of treatment. |
| 10. A.O. | 3 mos. | 2 mos. | Abscesses of Urethra<br>Abscess of Prostate<br>Acute Epididymitis | Treated with catheter from the start. Entire urethral tract involved. In addition to this patient was allowed a young pretty nurse, and was in state of eroticism. |
| 11. N.K. | 17 ds. | 2 ds. | Acute Prostatitis<br>Acute Seminal Vesiculitis | Was treated by Janet Irrigator. Medicine forced into Bladder. |
| 12. M.S. | 4 mos. | 1 wk. | Acute Vasitis<br>Acute Epididymitis | Had Diathermy treatments. Electrode passed into urethra twice weekly. Evidence of posterior involvement from the start. |
| 13. J.Ca. | 8 mos. | 6 mos. | Recurrent Epididymitis<br>Seminal Vesiculitis | Treated by Gravity Method. When a complication occurred medicine was changed (a stronger one than the preceding). |
| 14. M.H. | 8 ds. | 4 ds. | Acute Prostatitis | Made up a solution of silver nitrate which he himself injected and noticed severe burning from the start. Meatus black from silver nitrate burn. |
| 15. Ch.J. | 5 wks. | 3 ds. | Acute Prostatitis | His doctor passed a sound |

ANALYSIS OF POSSIBLE ETIOLOGIC FACTORS IN TWENTY-FIVE CASES OF GONORRHEAL URETHRITIS WITH COMPLICATIONS (Cont'd)

| Case No. | Name | Duration of Infection | Duration of Complication | Type of Complication | Possible Etiologic Factoss as Elicted from Patient's History |
|---|---|---|---|---|---|
| 15. Cont'd | | | | | because "he was not doing well." Two days later evidence of posterior urethritis. |
| 16. | M.K. | 10 wks. | 4 wks. | Subacute Epididymitis | His Doctor used Gravity Irrigator. Patient infected himself via piston-syringe. |
| 17. | J.K. | 2 mos. | 5 wks. | Acute Epididymitis | Ate no meat, but drank alcohol. |
| 18. | J.A. | 3 mos. | 5 wks. | Subacute Epididymitis | Treated via catheter. Used cotton as dressing. It acted as a plug and as a source of reinfection. Had tight foreskin. Refused Circumcision. |
| 19. | S.T. | 2 mos. | 2 wks. | Subacute Epididymitis | Apparently no obvious cause for the complication. Was a chauffeur and drove about all day. Allowed bladder to become overdistended if inconvenient to urinate. |
| 20. | M.S. | 1 wk. | 2 ds. | Posterior Urethritis Prostatic Absess | Treated with Diathermy. |
| 21. | J.R. | 2 wks. | 3 ds. | Posterior Urethritis Acute Epididymitis later | No obvious cause. A blond haired Individual. |
| 22. | H.B. | 5 mos | 3 mos. | Subacute Epididymitis | Used a piston-syringe. Pin-pount meatus. Urethritis began to improve with meatotomy. |
| 23. | G.D. | 6 wks. | 1 wk. | Acute Prostatitis | Was treated with Gravity Method. Medicine changed several times because he was not doing well. Each time medicine was "Stronger." |

ANALYSIS OF POSSIBLE ETIOLOGIC FACTORS IN TWENTY-FIVE CASES OF GONORRHEAL URETHRITIS WITH COMPLICATIONS (Cont'd)

| Case No. Name | Duration of Infection | Duration of Complication | Type of Complication | Possible Etiologic Factors as Elicted from Patient's History |
|---|---|---|---|---|
| 24. P.B. | 3 wks. | 2 ds. | Acute Prostatitis | Gravity Method used. No advice against taking spices or alcohol. |
| 25. E.A. | 10 ds. | 2 ds. | Acute Prostatitis | Received diathermy treatment. Electrode passed into urethra. |

Complications of Acute Gonorrhea. 2. Folliculitis. Folliculitis consists in suppuration of one of the urethral follicles with retention of the pus, forming a small abscess. This, if left to itself, opens spontaneously either into the urethra or through the skin. If it ruptures through the skin it is likely to leave a fistula in the urethra which is very persistent. The treatment consists in opening the abscess freely as soon as fluctuation is noticed, evacuating the pus, and allowing it to heal by granulation. It should be opened through a urethroscope from within the urethra, when this is practicable. If incision is done promptly, the occurence of a persistent urethral fistula is prevented.

3. Chordee. The patient subject to chordee should empty his bladder just before going to bed; should sleep in a cool place, lightly covered; and, to avoid sleeping on his back, should tie a towel around his waist with a knot at the back. Before going to bed the penis should be given a prolonged immersion in hot water. When the patient wakes with chordee, he should get out of bed and immerse penis and testicles in cold or hot water, and before going back to bed should empty the bladder. He should be warned of the danger of "breaking" chordee. In severe cases sedatives are necessary; potassium bromide, 2.0 gm. , or camphor monobromate 0.3., in the afternoon and before going to bed, are useful; in extreme cases a morphin rectal suppository may be necessary.

4. The Vasa Deferentia and the Epididymis. The most frequent sequelae produced by urethral gonorrhea in the male is inflammation of one of the vasa deferentis and epididymis.

Like pharyngeal catarrh of the mucous membrane traveling downward and attacking the larynx, trachea, and bronchi, so the catarrhal affection of the prostatic portion of the urethra not infrequently extends to the vasa deferentia and epididymis. The affection of these organs, consequently, is not to looked upon as a metastasis, i.e., as a leap of the catarrhal affection from the urethral tract to the testis, but it originates through contiguity--in other words, the catarrhal process travels on from cell to cell. It is a wonder that the parts mentioned do not become affected inaall cases of catarrhal inflammation of the prostatic urethra, and, furthermore, that even in the most pronounced cases of inflammation of the epididymis the simultaneous inplication of the vas deferens is not always apparent. This last condition after all, has its analogy in the pathogeny of buboes that undergo resolution, and which originate, in the majority of cases, without any apparent inflammation of the lymphatic vessels. As a rule, however, in epididymitis in consequence of gonorrhea, there is found an inflammatory thickening of the corresponding vas deferns or spermatic cord, and seldom is a vas deferens affected without the coincident disease of the epididymis.

In inflammatory affections of the vas deferens the patients complain of severe pains in the vicinity of the abdominal ring, through which the affected spermatic cord passes into the inguinal canal. The pain spoken of becomes aggravated on touching the cord, the latter being readily felt as a dense, hard, roung string, like a goose-quill. The loose connective tissue of the tunica vaginalis testis and

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scrotum become infiltrated with serum, and swollen. General disturbances of the system soon supervene. As in epididymitis, the patients complain of chilliness and a feeling of heaviness in the head, the pulse becomes quickened, the temperature of the skin elevated.

The subjective symptoms of epididymitis usually come on suddenly. The patients claim to have felt at the beginning of the disease a sensation as if a drop of hot liquid had dropped into the affected scrotum. Soon after the affected testis appears to them to have become markedly heavier and walking in irksome. During the first three days the diseased epididymis is felt as a doughy mass at the inferior part of the posterior scrotal wall. On the third or fourth day the swelling of the epididymis becomes more tense, and the organ usually descends still lower. In this manner a twisting of the axis of the testicle upon its transverse diameter takes place. In some cases a twisting of the axis of the testicle upon its longitudinal diameter takes place, the epididymis appearing at the anterior instead of at the posterior border of the testis. In the progress of the disease the testis itself swells up. Sometimes attaining the size of a fist; the increase in size, however, is not due to swelling of the parenchyma of the testicle, but to serous effusion into the tunica vaginalis testis (acute hydrocels). Finally, there also occurs a serous infiltration into the loose cellular tissue of the scrotal integument; its

wrinkles become affected, and it acquires a bright-red color. These phenomena indicate that the epididymitis has attained its height, in which condition it usually remains for five or six days. On the tenth day of the disease, resolution begins, ushered in by febrile exacerbation, and the effusion into the subscrotal connective tissue and into the tunica vaginalis testis begins to be absorbed. The subjective and objective symptoms gradually disappear so that the disease generally terminates by the beginning of the third week, leaving no trace behind it, save a painless hardness of the epididymis consequent upon hypertrophy of its connective tissue. This hardness generally does not interfere with the functions of the testicles; occasionally it is liable to cause a temporary and even permanent impotency. Occasionally, even after the termination of an epididymitis, the semen for some time has a rusty color, due to the admixture of blood.

Inflammation of the spermatic cord and of the epididymis in consequence of urethral gonorrhea is generally unilateral. One epididymis is as often affected as the other, but not both simultaneously. The disease in one generally comes entirely to an end before the other is attacked, and in such cases the left testis is always the one first affected.

Although epididymitis terminates favorably in most cases, still in some fistulae form in the scrotum, and still more often a permanent accumulation of serum in the tunica ensues. We have, moreover, observed that persons who have suffered from repeated attacks of epididymitis, if they

subsequently acquire syphilis, readily becomes affected with albuginitis syphilitica.

Immediately on the development of epididymitis all injections or instrumentation of the urethra must be stopped, the patient be confined to bed, and put on a light diet. The testicles should be elevated by a bandage going under them and over the thighs, and hot applications should be made. Hot sitz baths for half an hour three times daily are soothing and hasten recovery. If the symptoms are severe, epididymotomy may be performed. This immediately relieves pain and hastens recovery.

In a few days the acute stage passes. The urethral discharge is then likely to recur, but local treatment of the urethra must be resumed only after a considerable period of rest and with the greatest caution. A suspensory bandage should be worn until the patient is entirely well. There is in many of these cases a chronic inflammatory exudate in the epididymis, which in time often disappears. Massage of it may hasten its absorption.

5. Acute Prostatitis. In acute prostatitis the indications are (1) to lessen the severity of the posterior urethritis; (2) to prevent suppuration of the prostate; (3) if pus forms, to evacuate it promptly by incision.

The patient should be put to bed, and, if necessary, the pain and tenesmus controlled by opium suppositories. Locally either ice-bags or hot poultices are applied to the perineum, a safe guide for the choice between hot and cold applications being the amount of comfort which is given to the patient.

Hot sitz baths of from one-half hour to an hour's duration two or three times daily are always indicated. Irrigation of the rectum with hot water for half an hour at a time may be used instead.

If retention of urine should occur, it may be necessary to introduce a catheter, but this should be done only when absolutely necessary. Before catheterizing, the urethra should be well irrigated to free it from pus. One c.c. of 2 per cent. cocain solution may be injected into the urethra to relieve pain and facilitate catheterization.

Prostatic Abscess.--When a very limited area of suppuration of the prostate is present, involving perhaps two or three of the prostatic tubules, the temperature is only slightly elevated, and the local symptoms are not marked. After two or three days the temperature becomes normal and the tenesmus and frequent urination disappear.

If, on the contrary, the symptoms do not improve within the first week, but the fever continues and chills occur, the local symptoms grow worse, and rectal examination shows an increase in the size of the inflamed prostate, it is evidence that an abscess is forming. These symptoms constitute an urgent indication to evacuate the pus; for if the pus is allowed to break through the capsule of the prostate, it will burrow through the tissues and may cause urinary infiltration and pyemia, or, at least, a fistula which will not heal without operation. In these cases immediate surgical measures are indicated. Two operations may be used to evacuate the pus.

1. The prostate may be exposed by a transverse incision in the perineum, and the collection of pus evacuated without opening the urethra.

2. An incision may be made in the perineal urethra, the mucous membrane of the prostatic urethra broken through with the finger, and the pus collection evacuated through the opening thus made.

Prostatitis. Patients suffering from postatitis are troubled on the one hand with difficulty in defecation, and, on the other, from frequent desire to urinate. For the purpose of expelling the urine forcibly, the patients, taking a deep inspiration, endeavor to compress the bladder by the action of the diaphragm and the pressure of the abdominal walls. Through the action of the levator-ani muscle, however, the prostate is elevated and compressed against the symphysis pubis, thus causing still more compression of the urethra that is already narrowed, and entirely preventing the flow of the urine. Not till the patient, completely exhausted, becomes totally passive, and entirely avoids straining, will the urine flow in drops or in a very thin stream variously shaped, causing a violent burning sensation in the urethra. Like patients suffering from stone, those suffering from prostatic disease seek, by pulling or manipulating the penis, to ease the flow of the urine. The introduction of a catheter or sound is quite difficult, and such instruments only will pass as have a large curve. Just at the moment when it is necessary to depress the handle of the sound for the purpose of passing it into the bladder, the beak is often

turned to one side or the other, because the urethra, in consequence of the unequal enlargement of the prostate, has deviated from its normal position, and the instrument is twisted to the right or left, according as the right or left lobe is more swollen. When the central part of the prostate is swollen it is entirely impossible to introduce an instrument into the bladder, or this can only be done by force. By a digital examination per rectum, the anterior wall of the gut is found to be bulged out by a painful tumor. This painful condition of prostatitis generally lasts from five to eight days. Prostatitis terminates either in gradual absorption of the swelling or in suppuration. The latter is generally ushered in by febrile movement, indeed even a chill may occur. The moment the pus is evacuated the patient feels relieved. When the abscess bursts into the rectum, the fecal masses may find their way into the cavity of the abscess, causing grave complications, such as gangrene and pyaemia. If the abscess opens into the rectum or urethra, the disease will almost always terminate unfavorably.

6. Acute Seminal Vesiculitis. The general treatment of acute vesiculitis is the same as that for acute prostatitis, with which it is usually associated. Injections into the anterior urethra, of course, are contraindicated; but above all things, any attempt at massaging or stripping the vesicles should be avoided.

The experienced physician will be able, on examination with the finger in the rectum, to detect, in pronounced cases

inflammation of the seminal vesicle. The latter is situated on the posterior surface of the bladder, directly behind the prostate, and, when inflamed, will assume the form of an oblong oval, painful and hot swelling, having a doughy feel. The subjective sensations in inflammation of the seminal vesicle differ but little from those in prostatitis. There is but one symptom that belongs exclusively to the disease under consideration, namely, the erections are well-nigh constant, and so painful as to constitute priapism. Involuntary seminal emissions occur, attended by burning pains, the semen occasionally being red from an admixture of blood (red pollutions), or yellow from pus. In the intervals between the involuntary emissions, discharges from the urethra containing spermatozoa mixed with blood or pus also take place. A continued fever becomes superadded very early to this local phenomenon. In cases of intense inflammation the seminal vesicle may become transformed into a veritable pus-receptacle, which gradually empties itself into the urethra, or ruptures posteriorly into the rectum. As a result of suppuration, the seminal vesicle may disappear entirely or become obliterated. If the disease assumes a chronic character, the seminal vesicle may undergo induration, calcification, and ossification. In tuberculous persons the exudation in and around the vesicle may undergo caseous degeneration. The result of grave disease of both seminal vesicles is sexual impotence. There are no special remedies that can be resorted to in the treatment of inflammation of these organs, and those that

have been found efficacious in the treatment of prostatitis will, in general, also answer here.

7. Cowper's Glands. In very rare cases the inflammatory process extends from the bulbous and membranous parts to the excretory ducts of Cowper's glands. The disease of the glands can only be assumed to be present with certainty when the connective tissue surrounding them is also involved. In this case there originates, between the scrotum and anus, on the right or left side of the raphe, a more or less circumscribed swelling, which is painful at the slightest touch. Micturition is somewhat difficult. Under appropriate treatment the swelling disappears entirely in ten or twelve days; in very rare cases it terminates in suppuration, opening externally or bursting into the urethra. As soon as fluctuation can be detected the abscess should be opened in order to prevent it from rupturing into the urethra.

8. Gonorrheal Ophthalmia. Every case of acute conjunctivitis in a gonorrheal patient is a condition requiring expert attention, and should be immediately referred to an Ophthalmologist.

9. Gonorrheal Cystitis. The bladder, as a rule, only becomes affected, as a result of gonorrhea, in those cases in which the disease has already involved the prostatic part of the urethra. At the beginning the disease generally attacks the neck of the bladder only; gradually, however, the fundus is also affected. The disease of the neck of the bladder has an acute character, while that of the fundus is chronic.

So long as the catarrhal disease is limited to the neck of the bladder, the patients complain of frequent desire to urinate and to defecate. If the patient endeavors to relieve himself, he only succeeds, under the most distressing pains, in passing a few drops of concentrated acid or neutral urine. After the last of the urine has been voided, one or more drops of blood as a rule follow. A digital examination per rectum, in most cases, causes an unbearable pain in the region of the prostate, and the introduction of a catheter is usually impossible, because the neck of the bladder, in consequence of the spasmodic contraction, is impassable. When properly managed, the acute phenomena will be relieved in from eight to twelve days.

The extension of the inflammatory disease of the urethra to take neck of the bladder is promoted or occasioned by various influences. Chief among these are a liberal indulgence in fresh, unfermented beer, unfermented wine, champahne, and soda-water. In addition, injections unskillfully and violently, or too often made, or of too strong solutions, may lead to the involvement of the neck of the bladder. It is very often occasioned by the violent use of sounds and catheters, and by the impaction of calculi.

Chronic cystitis gives rise to more important pathological alterations than the acute variety. It results in hypertrophy of thé muscular coat of the bladder with simultaneous thickening of the mucous membrane, and in

consequence of these lesions paralysis of the viscus may follow. Gradually the ureters, the pelves, and even the kidneys may become diseased. The mucus, pus, and blood-coagula that remain in the bladder may serve as the starting-point for the formation of calculi. Finally, suppuration and ulceration of the bladder may take place, and hence it is readily understood how chronic cystitis may terminate in death, either directly or by retention of urine, and uraemia.

Disease of the bladder is the most serious complication of urethral gonorrhea. It has tendency to relapse and to become permanent. So long as the vesical affection is limited to the mucous membrane of the neck the prognosis is still favorable, but if the disease has extended to the fundus of the bladder the physician should be guarded in his prognosis.

When the neck of the bladder only is affected, the main duty of the physician will be to relieve the vesical spasm and the painful micturition. For the purpose of allaying the vesical tenesmus, there is nothing better than the local and internal employment of the anti-spasmodic and narcotic remedies.

10. Gonorrheal Nephritis. No morbid conditions that originate in consequence of gonorrhea of the urethra escape the notice of the physician so often as those that develop in the kidneys. It is a settled fact that the kidneys, in most cases, are not attacked by acute gonorrhea, even if the latter extends to the prostate and bladder, and that it only attacks the straight renal tubules when it has existed for a long time and involved the bladder.

The course of a nephritis occasioned by gonorrhea is usually rapid and favorable. The prognosis depends upon the intensity of the primary disease. If the vesical catarrh is intense and purulent, there is danger that the catarrhal nephritis will become suppurative.

Renal catarrh, due to gonorrhea of the bladder, generally disappears when the primary disease disappears. Hence the treatment of the vesicle and renal catarrh must go hand in hand.

11. Gonococcal Arthritis. Gonococcal arthritis undoubtedly is the most damaging and maiming complication of gonorrhea. It occurs in from two to three per cent of all gonococcal infections. It may make itself manifest during any stage of the inflammation, the favorite site being one or more of the joints.

For years past, there has been continued and acute discussion as to whether gonococcal arthritis was a metastatic lesion, or a lesion due to the gonotoxine. The reason why several observers held the latter view was that they failed to find the gonococcus in the fluid which they drew off. In those cases tested for the presence of antibody and antigen, the former was found, but not the latter. The reason why the gonococcus is not generally found in the fluid, it that it remains limited to the synovial membrane. It is just the same with the tubercle bacillus in a cold abscess. The organism is not found in the pus, but in the wall of the abscess. It is now almost universally agreed that a gonococcal arthritis is a metastastic lesion.

No case of gonococcal arthritis should be treated lightly, because a joint affected from any specific cause is always liable to become secondarily infected. If any one has seen a pyogenic infection of a gonococcal joint, the picture is not likely to be forgotten. Within a few days of the joint's becoming purulent, the patient may die, and should the case not terminate fatally, bony ankylosis is all that can be hoped for.

Gonococcal arthritis can generally be prevented, if all gonorrheal patients are strictly forbidden taking any exercise, a point which is proved by the enormous numbers of soldiers who have been invalided.

Before a true arthritis becomes manifest, the patient usually experiences fleeting sharp pains in the joint which is to become affected. If rest is ordered, and if vaccines are injected without delay, the progress of the inflammation may be checked.

The statement has frequently crept into writings that women are immune from gonococcal arthritis. Such is far from being true, as both men and women are equally affected.

A man who contracts gonococcal arthritis is practically certain to have a prostato-urethritis, and a woman is certain, at least, to have a cervicitis. More often she has an endometritis, and in many cases she has a salpingitis. Therefore, no case of arthritis should be treated without the main attention being paid to the site from which the organisms enter the blood stream. It must not be forgotten

that, although we generally refer to adults when speaking of gonococcal arthritis, the complication may also occur in cases of infantile gonococcal conjunctivitis, and it is not at all uncommon in cases of vulvo vaginitis affecting young girls.

An arthritis may complicate the first attack of gonorrhea, but it more often starts during the first or second recurrence of the uncured original attack. Should the patient have repeated recurrence of his urethritis, and an arthritis of one knee joint, which complicated his first recurrence, this same knee joint is apt to light up again in each future recurrence. This condition of affairs is quite pathognoconic of gonococcal arthritis. The types of gonococcal arthritis allow themselves to be conveniently divided into four classes. (1) Hydrops articuli; (2) serofibrinous arthritis; (3) purulent arthritis; (4) phlegmonous arthritis.

1. Hydrops Articuli.--Usually without any warning, a joint which is most commonly the knee, becomes suddenly distended with fluid. The joint is not even painful. The fluid may disappear as quickly as it came, recurrence is common, and, as the amount of fluid may be considerable, repeated distention of a joint is liable to lead to a destruction of its ligaments. More rarely the fluid takes a long time to disappear. In these cases, if the distention is very marked, it is imperative to tap the joint.

A joint should never be tapped except under the strictest aseptic precautions. The knee is practically the only joint

for which the operation has to be undertaken. The limb is extended and a lumbar puncture needle is inserted between the external condyle of the femur and the external tuberosity of the tibia. The fluid should be allowed to escape only slowly, and, after it has been removed, a rubber bandage should be applied from below upwards, and the patient should be kept at rest. If the knee is not bandaged at once, it may fill up again with fluid in an hour or two. Subcutaneous injections of the withdrawn fluid in the region of the affected joint has never been of any benefit.

The synovial membrane and capsule remain thin, in cases of Hydrops articuli.

2. Arthritis serofibrinosa.--This is by far the most common form of gonococcal arthritis. Both the synovial membrane and capsule are usually thickened. The withdrawn fluid looks not unlike serum, and it is called fibrinous, owing to the amount of contained fibrin, which frequently causes the fluid to clot.

With this form of arthritis the patient usually looks very pale and ill. The muscles along the joint soon become atrophied, and any of the focal complications which have been described may accompany this form.

This form of arthritis is very liable to recur, and at each recurrence the capsule becomes still more thickened. Owing to the amount of fibrin which has formed, adhesions are liable to follow the subsidence of the inflammation.

3. The purulent arthritis usually arises from the serofibrinous form, becoming infected with pyogenic cocci.

4. Phlegmonous arthritis, which was so christened by Konig, is an arthritis in which the capsule and the periarticular tissues are the structures most affected. The joint is often markedly swollen, but the amount of fluid in it is very small. This form of arthritis has frequently received the name of pseudomembranous. As the inflammation is most acute in the periarticular tissue, the subcutaneous tissue is edematous, and the sking over it is very red and painful. The inflammation quickly spreads to the interior of the joint, and destroys all the ligaments, hence it is in the phlegmonous arthritis that subluxation of the tibia, and other orthopaedic deformities are most likely to occur.

In phlegmonous arthritis, absolute rest should be enforced, since, owing to the acuteness of the inflammation, a pyogenic infection is apt to find its way into the joint. Vaccines should be injected as quickly as possible. All the antiphlogistic measures should be employed, and the limb fixed in that position in which bony ankylosis would least impair its usefulness, since bony ankylosis is the result to be hoped for.

In the mild cases of phlegmonous arthritis, and in the chronic cases of arthritis serofibrinosa, changes in the joint may be produced which become indistinguishable from the condition that is called osteoarthritis. The cartilage is worn away, the bony surfaces become eburnated, and the edges develop osteophytic growths.

Although polyarticular arthritis is not uncommon in gonorrhea, the monoarticular form is certainly the most frequent. As a rule, not more than two or three joints are affected at a time, although several may be affected at different intervals.

Owing to the small size of the finger and toe joints, periarticular changes are practically constant; and as these almost invariably lead to a chronic complication of these tissues, the patients usually have a permanent broadening of their fingers and toes, at the metatarso and metacarpophalangeal joints.

Any patient who has had a gonococcal arthritis is very likely to suffer for years afterwards with what may be called arthralgia. Such patients are apt to notice changes in the weather and changes in temperature. It is well to bear this arthralgia in mind, as it is often mistaken for a recurrence of the arthritis. The local application of unguentum iodex or colloidal iodine oil, or unguentum guaniacol (10to 40 per cent) quickly disperses the arthralgic pains.

The knee is far the most frequent joint to be affected indeed Hydrops articuli is rare in any other. After the knee, come the ankle and wrist joints. The metacarpo and metatarsophalangeal joints are frequently affected, also the other small joints of the foot. Arthritis of the joints of the upper extremities, other than those already mentioned, is not very common. The elbow is affected more often than the shoulder, in many cases it is the only joint affected and there is usually a marked wasting of the muscle

along the joint. When the hip joint is affected, it is usually the only joint that is involved. Any joint may be affected, but arthritis in other than those already mentioned, is rare.

It is important to differentiate gonococcal arthritis from other types of joint infection. This is particularly true in the subacute and chronic types, which may be mistaken for joint tuberculosis. Both conditions have symptoms in common; thus there is a general decline in health; the temperature and pain are variable. But the diagnosis can be made on these data; The presence of an existing gonococcal infection, acute or chronic; more than one joint usually involved, in tuberculosis rarely so; as a rule, there is more pain and tenderness; there is more marked swelling and discoloration and there is a greater tendency in involvement of the tendons and fascia than in tuberculosis; in the latter disease, there may be and often is a tuberculous focus elsewhere in the body or a history suggestive of tuberculous; tubercle bacilli may be found in the exudate, as against the presence of gonococci in gonococcal arthritis. Furthermore, in the latter type, the complement-fixation test if properly performed, should give a positive reaction. If may be accepted as a general rule, that in cases with a negative reaction combined with negative clinical and cultural findings in the prostate and seminal vesicles, we are safe in concluding that the arthritis is not gonococcal in origin.

The prognosis of gonococcal arthritis is favorable in the average case, though the probability of ankylosis and impairment of function is considerable. In severe cases,

permanent ankylosis, hydrarthrosis and suppuration may supervene, usually, however, the inflammation subsides slowly but surely and resolution takes place. The amount of permanent damage is in inverse proportion to the degree of resolution.

It should be remembered that with each new attack of gonorrhea the arthritis may recur, irrespective of the result attained in past attacks. A prognosis as to permanent cure should include this reservation.

Treatment.--There is no specific therapy for gonococcal arthritis. The one thing to guard against is the formation of adhesions. The usual treatment of inflammatory arthritis (rheumatism) is of no benefit whatever in this condition. Drugs have proved practically useless. Most important of all is the treatment of the gonococcal infection, both through local and constitutional measures. Rest in bed and immobilization, are imperative in the acute stage. Local applications to the inflamed joint have their field of usefulness. A favorite method is the local application of pure or 50 per cent ichthyol to the parts, covering them well with cotton or flannel.

In the subacute and chronic stages in the presence of large accumulations in and about the affected joints, redical surgical measures may be necessary. The joints may be tapped, the fluid withdrawn, and the joint irrigated with a hot anti-septic solution. Incision, followed by irrigation and drainage often is made necessary by existing conditions. For cases that are chronic from the beginning,

with little or no exudation, the application of counterirritation, often will be found useful.

<u>Chronic Gonorrhea.</u> Gonorrhea may be said to be chronic when it has lasted over six weeks. Chronic gonorrhea is always dependent on distinct pathologic changes in the tissues, the nature of which must be understood in order to apply correct treatment. For instance, it is useless to attempt to cure a urethral discharge from a chronically inflamed area behind a stricture, by massaging the prostate. It is equally futile to endeavor to relieve a urethritis depending on a chronic prostatitis, by dilatation and irrigation of the urethra. In most cases of chronic gonorrhea, especially those of long standing, the prostate, vesicles and urethral canal participate in the pathologic changes, and it is necessary to carry out the examination in a systematic manner in order not to overlook the various lesions. The following scheme for this examination is found to be practical:

1. History taken.
2. Inspection of external genitals.
3. Urethral smears taken for microscopic examination.
4. Urine passed: two-glass test.
5. Prostate and vesicles palpated by rectum, and expressed material collected on a glass slide for gross and microscopic examination.
6. Bougie examination of urethra for stricture, and meatotomy if necessary. For this purpose a bougie with a 26 or 28 F. tip should be used.
7. Endoscopic examination of anterior urethra, also of

posterior urethra in special cases.

All findings should be recorded as the examination is made.

<u>Chronic Anterior Urethritis</u>. The important pathologic change in the urethral tissues in gonorrhea is an infiltration of small round cells underneath the mucous membrane, surrounding and embedding Morgagni's crypts and Littre's glands. If the infiltration is superficial it is absorbed, but if it is extensive, the round cells become converted into connective tissue, forming stricture. The mucous membrane lining the urethra is destroyed in spots, leaving erosions, and these erosions as a result of inflammatory proliferation become converted into areas of granulations. In other cases the mucous membrane is not eroded and no granular patches are present; instead of loss of substance there is swelling, congestion and edema of the mucous membrane, which is the seat of chronic inflammation. The infiltration around the crypts of Morgagni keep their mouths open, which condition permits the cavities to become incubating places for colonies of gonococci, from which reinfections repeatedly take place. The above described conditions occasion a continuous gleety discharge, which will remain until they are removed.

Treatment.--Based on the pathologic changes in the tissues, the indications for treatment are:

(a) To rid the tissues of gonococci.

(b) To cure the catarrhal inflammation in the mucous membrane.

(c) To cause absorption of the submucous infiltration.

(d) To restore to normal the intraglandular and periglandular inflamed and infiltrated tissues.

These indications can be met by irrigations with antiseptic and astringent solutions and by dilatations of the urethra with sound and soft bougies.

When general catarrh of the mucous membrane is present and tubbidity of glass 1 exists, free irrigation of the urethra and bladder by the gravity method, daily or every second day, using silver nitrate or potassium permanganate, soon clears up the diffuse inflammation in the mucous membrane, until the process is no longer general, but is reduced to isolated spots. This condition is denoted by glass 1 being no longer turbid; it does, however, still contain the shreds derived from isolated erosions which are not covered by epithelial cells and are still secreting pus, or from the prostate ducts and Morgagni's crypts. Comma-shaped shreds which are often present are formed by the secretion from the open mouths of the prostate ducts and Morgagni's crypts. Gonorrheal shreds floating in clear urine continue until the submucous infiltrations resolve and the pathologic secretion of the prostate and crypts disappears.

In order to promote the absorption of the submucous infiltration it is necessary to pass steel sounds large enough to distend the urethra fully and put the ring of infiltration on the stretch. Meatotomy may be necessary in order to pass sounds of sufficient size.

The therapeutic effects of the sound can be materially increased by massaging the urethra over it with the fingers. The contents of Morgagni's crypts can in this way be expressed, and more favorable influence is exerted on the ring of infiltration in the submucous tissues.

Sounds may be passed too frequently. In cases of soft and recent infiltration, the intervals should be from four to seven days, always waiting until the reaction following has subsided. In cases of hard, organized infiltration the intervals should be a week. If the urethra is acutely inflamed and freely secreting pus, instrumentation is, of course, out of the question. Dilatations should not be started until the urine is clear and contains only shreds.

It makes no difference, as far as treatment is concerned, whether the submucous round cell infiltration is soft and recent or whether it has been transformed into scar tissue; the indications in either case are to promote its absorption by dilatation and pressure. Cases in which a considerable surface of mucous membrane is involved are unsuitable for dilatation until the catarrh has been checked by irrigations, and the superficial process has been localized in a few spots in the urethra, as denoted by shreds floating in clear urine.

Glandular Urethritis. Many intractable cases of gonorrhea lasting for years in spite of constant treatment are caused by a chronic inflammation of Morgagni's crypts. Such cases show few symptoms, the morning drop at the meatus being the most constant. But they are characterized by exacerbations of the discharge after slight provocation, with a free discharge of

pus containing gonococci, which leads the patient to believe that he has acquired a fresh infection. Urethroscopic examination shows the mouths of a few of the crypts to be open and pouting, with red and slightly elevated edges. In other cases the mouths of the crypts are occluded by a growth of epithelium. When the crypts are affected the gonococci may remain in them for years and the case remain infectious.

These cases should be treated by dilatations with full sized sounds followed by irrigations. When the mouths of the glands are occluded by the growth of epithelium, dilatation of the urethra opens them and forces out the purulent secretion. The irrigating fluid enters the cavities and acts on the chronic inflammatory processes within the glands. In that form of inflammation in which the mouths of the glands are held open and the entire crypt is stiffened and inelastic from the periglandular infiltration, dilatations cause the absorption of the infiltrate around the glands and promote a return normal.

When, after sufficient treatment by dilatations and irrigations, it is found by urethroscopic examination that a few glands still remain chronically inflamed and suppurating, and are thus foci of infection, these should be destroyed. This can be accomplished by bringing them into view with the urethroscope, and introducing a galvanocaustic needle. The cauterization must be very superficial and rapid; otherwise there will be danger of stricture formation. Not more than three or four crypts may be destroyed at a sitting. It is possible by destroying the glands harboring the gonococci to

cure in this way a chronic gonorrhea of years standing which has resisted all the other usual forms of treatment.

Chronic Posterior Urethritis. Acute posterior urethritis may recover without becoming chronic; more frequently it passes into a chronic stage analogous in its pathologic changes to those of chronic anterior urethritis. In chronic posterior urethritis due to gonorrhea, the prostate and seminal vesicles are usually involved. Acute posterior urethritis is invariably caused by the gonococcus, but chronic posterior urethritis is produced by other causes, among which are excessive sexual intercourse, masturbation, perineal traumatism, as from horseback riding.

Diagnosis.--A history of uncured gonorrhea or sexual abuse, especially when accompanied by the symptoms of sexual neurasthenia, prostatorrhea, and urinary and sexual disturbances, point to chronic posterior urethritis. Examination is necessary to confirm the diagnosis. The two-glass urine test is useful only in the event of a considerable amount of pus formation, in which cases glasses 1 and 2 are turbid, and contain small shreds like commas from the mouths of the prostatic ducts, the so-called "Furbinger's" hooks. When the secretion of the posterior urethra is scanty the diagnosis should be confirmed by examination with the posterior urethroscope. The posterior urethra is found to be purple, bleeding freely, and may be the seat of granulations. The colliculus is swellen and edematous, and bright red or bluish, and small polypi are often noted growing on its surface. In time the submucous infiltration becomes converted into connective tissue, and the

colliculus is flat, irregular and grayish white.

Treatment.--In the presence of free pus formation, urethrovesical irrigations by the gravity method with a solution of silver nitrate from 1:10,000 to 1:4,000 or potassium permanganate, 1:3,000, is the best method of rapidly reducing the purulent discharge. After the urethra becomes clear, the prostate and vesicles should be examined, and if found to be diseased must be massaged in connection with the irrigation. When the urethroscope shows the infiltrated changes localized to the colliculus, direct applications of from 10 to 20 per cent. silver nitrate solution should be made once a week through the endoscope. Granulations in the posterior urethra should be treated by cauterizing with strong silver nitrate solution. Small polypi, or granulations on the colliculus may be removed by scissors, forceps or a galvanocaustic point. If the utricle is infected it should be injected with silver nitrate solution with a small syringe.

<u>Chronic Prostatitis</u>. In almost every case of chronic gonorrheal urethritis the prostate is involved. Chronic prostatitis usually originates in an attack of acute prostatitis, but it may result from a slow, insidious extension through the prostatic ducts of an infection from the posterior urethra. Aside from its frequency, chronic prostatitis is perhaps the most important complication of gonorrhea, for the reason that the gonococcus, with all its

infectious qualities unimpaired, may be retained for years in the diseased tubular glands of the prostate without its presence being suspected. Probably most of the cases in which wives are infected with gonorrhea by their husbands come from uncured prostatitis. Chronic prostatitis is also important on account of the profound disturbance of the nervous system and the impairment of the sexual function, which is occasionally produces.

The first indication in the treatment of chronic prostatitis is to improve the general condition of the patient. Constipation is generally a prominent symptom, which is best treated with saline cathartics, because they have some effect in relieving pelvic congestion. All sorts of erotic excitement should be interdicted on account of their effect in inducing congestion of the prostate. Coitus should not be permitted, both because of its ill effect on the diseased prostate and because of the certainty of spreading the infection.

The most effective local measure is the emptying of the prostatic tubules of their retained and thickened contents by rectal massage two or three times weekly. In this procedure both lobes should be massaged from above downward and the manipulation should not be very vigorous, the object being to force out the prostatic contents by moderate pressure. Massage of the prostate is not well borne by all patients, and, if it produces irritating symptoms, it should not be persisted in. In order to lessen the danger of

epididymitis from prostatic massage, it is advisable to irrigate the urethra and fill the bladder before massage, with a solution of silver nitrate from 1:10,000 to 1:4,000 or potassium permanganate 1:3,000.

Treatment by massage and irrigation should be persisted in for from six to eight weeks, or until a microscopic examination of the expressed prostatic secretion shows only a small number of pus cells in the field. Many cases will be found to improve under massage up to a certain point and then remain stationary. In such instances it is advisable to stop treatment for a month. If after this intermission the remaining evidences of prostatitis have not disappeared, another course of massage may be given. such treatment should be repeated until the pus cells in the expressed prostatic secretion are found on microscopic examination to be only from four to six in a field, and lecithin bodies are abundant.

While treating chronic prostatitis, it is important not to overlook the chronic posterior urethritis which nearly always accompanies it. This should be treated by irrigation, dilatation, and other measures, as already described.

Chronic Seminal Vesiculitis. Chronic vesiculitis may originate from an acute attack of vesiculitis which does not undergo resolution; but as a rule it develops insidiously, as the result of the extension of a chronic inflammatory process which begins in the posterior urethra and extends through the ejaculatory ducts. The ejaculatory ducts is never occluded by the changes; throughout the whole course of

the disease it remains patulous, and sterility does not occur from this cause.

Chronic seminal vesiculitis presents itself in two varieties:

1. Atonic vesiculitis, in which there is chiefly an atony of the muscular fibers composing the walls of the vesicle.

2. Inflammatory vesiculitis, in which the walls of the vesicles are thickened and indurated as a result of inflammation, which may be simple, gonorrheal, or tuberculous in origin.

Wither form of vesiculitis may exist by itself; but usually there is a combination of atony and inflammation of the vesicular walls.

Treatment.--The treatment consists in massaging and expressing the contents of the vesicles twice a week. Massaging empties the vesicles of their inspissated contents, without forcing the muscular fibers to contract; and, by the relief of distention and the rest thus afforded them, the muscles recover their tone.

Contraindications to massaging are: (a) the existence of acute vesiculitis; (b) blood in the expressed material, or (c) excessive tenderness. With these conditions present, there is always danger of setting up an epididymitis.

In chronic vesiculitis the posterior urethra should not be overlooked, but should receive treatment, with irrigations or instillations or by applications made through the urethroscope as outlined under chronic posterior urethritis.

It is desirable not to apply local treatment to the posterior urethra and massage the vesicles at the same sitting, but rather to allow a couple of days of intervene.

The duration of treatment must be protracted, for it requires from two to twelve months to effect a cure. In obstinate cases characterized by marked sexual neurasthenia or intractable gonorrheal rheumatism, free incision into and drainage of the seminal vesicles may be demanded. This is a procedure requiring expert skill.

Cure.--Under treatment, as outlined above, cure can be obtained in practically all cases of gonorrhea. If, under such treatment, symptoms persist beyond a reasonable time in chronic cases, it is an evidence that some focus of infection persists which has been overlooked; and these cases should be carefully reexamined by an expert urologist. It may not be possible to cause the entire cessation of mucopurulent discharge from the meatus or the disappearance of all shreds from the urine, while treatment is continued; for this in itself may produce sufficient irritation to keep up a degree of inflammation of the urethral mucosa. If gonococci are absent, it is proper, in estimating the situation in a case, to disregard light filaments in the urine and a slight mucoid discharge from the meatus, and confidently to expect that these will disappear spontaneously with the cessation for treatment.

Test of cure of Gonorrhea The man should take vigorous exercise on the day before the one on which the

examination is to be made.

He should not urinate for two hours before the examination is made.

Examination should show the following findings:

1. He should have no uretheral discharge.

2. If a drop is found, it must be free from gonococci.

3. In the two-glass test, both Glass1 and Glass 2 must be clear and free from pus shreds. Epithelial shreds free from gonococci may be disregarded.

4. The secretion obtained by massage of the prostate and seminal vesicles must show no gonococci and few leucocytes.

5. Examination with a bougie should demonstrate the absence of stricture.

Female. Pathology. The pathology of gonorrhea in the female is in great part dependent upon the age of the patient. During menstrual life, the initial lesions are most often an endocervicitis and less commonly a urethritis; infection of the glands of the introitus are secondary and vaginitis is exceptional in this age. During this period of life, there is a probability of ascension of the infection to the uterine body and tubes. This ascension is most liable to occur during the act of menstruation, where the uterus is congested and the os dilated. It is therefore highly advisable that patients with gonorrhea remain in bed during menstruation, especially if the disease is still acute.

Before puberty and after the menopause the vaginal mucosa is not so resistant to infection, so that in these

extremes of age vaginitis is the common lesion. Before puberty this vaginitis is associated with a vulvitis, but after the menopause the vulva is not so liable to be infected as are the cervix and urethra. These cases of vaginitis are extremely resistant to treatment, as is also the endocervicitis of the atrophic uterus.

Pregnancy also alters the pathology of gonorrhea. There is commonly a vaginitis associated with marked roughening of the vaginal walls, and condylomata acuminata are prone to occur. Gonorrhea always increases the possibility of premature emptying of the uterus and vigorous treatment likewise increase the danger. Therefore, treatment must be gently applied. Douches must be of tepid water instead of hot and low pressure should be insisted on. Topical applications to the cervix had best be omitted. The excision of condylomata, the cauterization of ulcers, and the incision of vulvar abscesses may institute abortion. Any of these procedures should if possible be avoided, for it is greatly to the patient's interest the abortion should not occur during the acute stage of the disease.

General Considerations of Therapy in Female. Douches given during gonorrhea should not be too hot, else the damage done by the heat increases the area of involvement. A temperature of 110 degrees produces enough heat to relieve pain, dissolve secretions and improve the local circulation. Douches should be copious, six to eight quarts of water, in order that the action time of the medication may be increased

and becuase a prolonged irrigation relieves pain more than does a short one, and is less liable to induce bleeding. The douches should never be given under high pressure, especially during the acute stage, as it may force infection into higher regions. Ordinarily the bottom of the douche bag should not be over a foot above the level of the hips. During the infective stage, the douches should be taken while lying on a pan, since it is dangerous to others to take it while sitting on the toilet or lying in the bath-tub. Douches should be omitted during menstruation, but, if they are given, especially low pressure should be prescribed, with a temperature between 95 and 100 degrees, so as not to increase the chances of ascending infection or hemorrhage.

No rectal examination should be made nor enemata given, because of the danger of producing a gonorrheal proctitis.

During the disease, of course, coitus should be prohibited, not only that the man may not become infected but because the resulting trauma may be absolutely dangerous, or at least delay the cure. Complete directions should be given each patient in order that others may not be innocently infected. No nurse nor other person having to do with the care of children, who has gonorrhea, should be allowed to continue in her work because of the liability of direct implantation of the disease by the necessary attention to the toilet of children.

<u>Treatment of Acute Cervicitis and Endocervicitis</u>. A large douche of plain hot water followed by two quarts of 1:2,000 silver nitrate or potassium permanganate, may be given three or four times a day during the period of profuse discharge. This water does not enter the cervical canal and kill the gonococci, but it does furnish heat of therapeutic value and cleanses the vagina of irritating discharges which tend to macerate the cervical and vaginal mucosa. By washing away the infective organisms it also minimizes the danger of infection of the Bartholinian glands, the urethra and the peri-urethral ducts, if these are not already involved.

After douching for two weeks, the acuteness of the reaction in the cervical canal is generally so greatly reduced that topical applications may be made. At this time the cervix still gapes, but the cervical secretion has lost much of its purulent color and is more albuminous in character. After the cervical canal is swabbed as dry as possible, silver nitrate 10 per cent or pure tincture of iodin is applied to the lower three-quarters of an inch of the cervical canal. These applications are made twice a week until the cervix is practically free of mucus or until the cervical canal has returned to normal caliber, it being understood that the gonococci have not been found on repeated examination. Should bleeding result from these treatments, it indicates that the swabs have been introduced too deeply or that the condition is still to acute for topical application.

<u>The Treatment of Chronic Endocervicitis and Cervicitis</u>. The above outlined treatment should be carried out, increasing the strength of the topical application of silver nitrate to 20 per cent. Erosions of the cervix should be painted with this same solution. After all active evidence of inflammation has subsided, superficial cauterization of erosions may have to be performed, in order to rid a patient of an irritating discharge. When closure of the ducts of the mucous glands results in numerous Nabothian follicles, these are best treated by destruction with a finepointed electric or Paquelin cautery. This may be done in the office, care being taken not to do too much in one sitting and to allow sufficient time between treatments for healing to occur. In aggravated cases, under special conditions, the gland-bearing portion of the cervix may be excised by operation. This, of course, would only become necessary months after the time of the acute infection.

<u>Vaginitis</u>. Every vaginal gonorrhea begins by an undefined sensation, something between tickling and pain. The introduction of the finger or of a vaginal speculum gives rise to unbearable pain. Micturition also causes more or less pain. The discharge of a mucous gonorrhea of the vagina is thin, whitish, like mucus, or yellowish; the discharge of the purulent variety is thick, like cream, and has a yellowish-green color. The discharge of both varieties has an acid mucous membrane of the urethra, and of the cervix uteri, which reacts alkaline. This acid reaction seems to be due to the fact

That the virginal vulvo-vaginal mucous membrane furnishes a smegma-like secretion containing a fatty acid, while the follicles of the cervical portion of the uterus furnish a mucous secretion. Examined with the aid of a microscope, the discharge of a vaginal gonorrhea is found to contain mucous corpuscles, a few pus-corpuscles, and cast-off epithelium cells.

In attempting to make a digital examination during the initial stage of the disease, the vaginal orifice is found to be contracted and the temperature of the canal increased. Its mucous membrane is felt to be either soft and smooth, or rough and dry. On examining with a speculum a vagina that is affected with gonorrhea, the mucous membrane, after the discharge that has accumulated at the mouth of the speculum has been wiped away with some cotton is found to be swellen dotted with red spots, here and there excoriated, and turgid with blood. Occasionally the anterior part of the vagina especially is studded with minute granulations, which have originated through swelling of the follicles and of the papillae of the mucous membrane. In pregnant women these granulations attain an enormous size.

The local disturbances consist of erythematous redness of the external surfaces of the genital organs, caused by the discharge from the vagina flowing over them. The duration of a vaginal gonorrhea depends upon the habits of the patient, certain constitutional conditions, and the manner of treatment. A purulent gonorrhea, in women who

are otherwise healthy, can be cured in about fourteen days, provided menstruation does not interrupt the treatment and the cure, which it is apt to do, experience having shown that it will start the disease anew, after it was entirely checked. If the treatment of an acute vaginal gonorrhea is abandoned too early, and the woman indulges in sexual intercourse, the inflammation either relapses or the catarrhal hypersecretion becomes permanent (chronic vaginal gonorrhea). As a result of the chronic process, and still more from the astringent liquids used against it, the mucous membrane becomes hypertrophied, loses its velvety appearance, feels rough and dry, like tanned leather (xerosis vagina), and causes a grating noise when a speculum is introduced.

For the purpose of curing a vaginal gonorrhea, the woman, above all things, must practice the utmost cleanliness. In cases of intense swelling of the mucous membrane, cold compresses, cool sitz-baths, or the cold-water vaginal douche, by means of the fountain-syrings, should be employed.

Treatment of Vaginitis. During the acute stage, vaginitis is to be treated by douches as outlined above. Soft eampons of cotton soaked in 1:200 silver nitrate solution may be gently inserted in the vagina by the physician and removed by the patient after two to four hours. If too much pain results, protargol 5 per cent. or argyrol 10 per cent. may be substituted for the silver nitrate. When the edema has disappeared, topical applications may be made directly to the vaginal wall. Silver nitrate 10 per cent,

is painted over the cervix and the vaginal wall in its entirety, care being taken not to let an excess of silver nitrate run down upon the vulva. It is well to insert a pledget of cotton just inside the vaginal entrance immediately after this treatment; this may be removed by the patient just before the next douche. If stubborn spots or ulcers persist, the cautery should be lightly applied. Condylomata are best removed by the gàlvanocautery, a few at a time, unless the patient is to remain in bed under attention.

Vaginitis of Infants. As pointed out by Hess, by Rubin and Leopold, and by Norris and Mickelberg, the pathology of the disease in strictly an endocervicitis. The postmortem report of Hess in children dying from other causes but who suffered from chronic vaginitis, was as follows: "The vagina appeared negative as did the body of the uterus and the appendages. The only abnormal condition was redness of the tip of the cervix, which however did not extend along the canal to the internal os. microscopical examination confirmed this." The sole lesion in the latent or chronic cases is therefore an inflammation of the cervix about the external os. Dr. J. Hubert von Pourtales, of New York in his article "Control and Treatment of Gonorrheal Vaginitis of Infants" writes, "In my experience the tube and ovaries have never been the seat of the inflammation in any cases that have come to autopsy, nor clinically has an instance of gonorrheal peritonitis been observed."

Treatment.-- The patients are classified according to age and receive a thorough vaginal irrigation of sterile warm water. Volumes used for irrigations vary as follows:

6 mo to 1 yr---------------2 ounces
1 yrs to 2 yrs.----- ------4 ounces
2 yrs to 3 yrs.------------7 ounces
3 yrs to 4 yrs.-----------10 ounces
4 yrs to 6 yrs.-----------15 ounces.

Cervical smears were made once a week and the results classified as follows:

Positive (showing extra-and intracellular Gram-negative organisms) Mucus, but suspicious (showing pus but no organisms) Negative (showing no pus, no organisms but an occasional epithelial cell). At the receipt of the first negative smears all treatment is stopped at once. Smears from these cases are further examined for the next three weeks. If they remain negative on no treatment, the patient is discharged as improved; but should the smear show evidence of reappearance of the old condition, treatment is continued for another cycle. All the discharged cases are observed weekly by a social service nurse and returned to the hospital for an examination once every month for one year. At the end of the year, gonorrheal fixation tests are made at another laboratory as a check-up. Dr. Pourtales reached the following conclusions.

1. The recognition and segregation of latent or chronic cases of gonorrheal vaginitis is very important in the prevention of epidemics in.
2. Effective laundering of diapers will be a sure means of preventing new or re-infection.
3. The numerous methods of treatment used here have been disappointing in their results. I conclude that effective sanitary measures without any medical treatment have been the source of my apparent success in controlling gonorrheal vaginitis at this hospital.

Vulvitis. Vulvitis begins with sensual itching, which changes to a burning sensation. If any part of the mucous membrane is denuded of epithelium, or excoriations and erosions such as usually occur on the labia majora and minora at the fourchette are present, the patients will suffer severe pain during micturition. If the disease becomes aggravated the parts of the vulva, provided with loose connective tissue, become swollen. The nymphae become enlarged to three and four fold their size, and, as a consequence, project in front of the labia majora and are strangulated by them. In purulent vulvitis it is considerable in quantity, thick like cream, and yellowish-green in color emits a peculiar, fetid odor, irritates the adjacent mucous membrane, and produces erythema of the skin in the genito-crural and inguinal folds.

Mild cases get well soon, if the diseased parts are washed several times daily.

The treatment of Vulvitis.--Rarely does a vulvitis exist without disease farther up the genital canal, but, if it does, care should be exercised not to spread the infection upward. During the actue stage, rest in bed is usually required by the patient's discomfort. Acetylsalicylic acid or pyramidon is generally sufficient to control the pain. An ointment of protargol 5 per cent., spread on gauze may be applied to the vulva, and if itching is present, ½ per cent. phenol is added to the ointment.

In chronic cases, the infected Bartholinian and paraurethral ducts are to be injected through a blunt hypodermic needle with 10 to 20 per cent silver nitrate and the vulva painted with 2 to 5 per cent. solution.

The Treatment of Bartholinitis. Hot applications should be made during the acute stage of a bartholinitis; and rest in bed with sedatives is to be prescribed for pain. Just as soon as an abscess has formed it should be incised and drained and only if drainage persists or exacerbations occur should the gland be removed. A cystic or chronically infected gland should always be excised instead of drained, but considerable danger attends the practice of removing by dissection acutely inflamed glands.

The Treatment of Urethritis. This is not always present in gonorrhea in the female and many cases run their entire course without any urinary disturbance. When present it is frequently of short duration, not very distressing and cures itself spontaneously. The burning on urination may

be lessened by copious drinking of fluids, and the attack may be shortened by acidification of the urine, and hexamethylenamin, a dram a day in divided doses. When the genital tract is invaded, as it usually is, the prolonged hot douches advised elsewhere furnish much relief from the pain.

In subacute cases, bougies three quarters of an inch long, of 10 per cent, argyrol or 5 per cent. protargol in cocoa butter, may be inserted by the physician and the patient instructed in this insertion. These bougies should be inserted after urination and held in position until they tend not to escape.

In chronic cases, the urethra may be lightly massaged before urination; this tends to tmpty the crypts along the urethral canal and hastens the absorption of inflammatory diposits. If this massage is followed by an exacerbation of symptoms, it has been begun too early. In stubborn cases, an endoscope should be inserted, and silver nitrate 10 per cent. be lightly applied to the inflamed area; this failing, a sound just large enough to distend the urethra should be coated with protargol ointment 10 per cent. and inserted, and light massage of the urethra carried on; this is done twice a week. The bladder should be full during this treatment and then emptied immediately. Stricture of the urethra is a rare complication, but should be

suspected in cases with recurrent symptoms, especially if associated with difficulty in urination. The treatment of stricture is the same as in the male, but is much more readily performed.

If Skene's or the para-urethral ducts remain infected, recurring difficulty may be expected. If injection of 10 per cent. silver nitrate through a blunt hypodermic needle does not perfect a rapid cure, then with a probe as a guids, a galvanocautery should be used to destroy the crypts in their entirety.

The Treatment of Cystitis. Cystitis in the female is not existent as often as treated; but when actually demonstrated to be present, the treatment is the same as in the male.

The Treatment of Metritis and Endometritis. During the acute stage, rest in bed is strictly advised. Hot or cold applications over the lower abdomen are to be given for the relief of pain.

Acetylsalicylic acid (aspirin) and pyramidon or other analgesics may be prescribed, but rarely are opiates necessary. When extreme pain is present, it generally indicates that tubal involvement has already occured. Hot douches, as advised in endocervicitis, are to be ordered, but local applications are absolutely inadvisable and damgerous during the acute stage, ergot should be given in order to diminish bleeding.

When the disease has become chronic in the uterus, treatment depends upon symptomatology. The knowledge that

gonorrhea has existed does not indicate treatment. If menorrhagia occurs and is not brought under control by a prolonged course of hot douches and ergot, a curettage followed by a liberal intra-uterine application of tincture of iodin is indicated. If tubal involvement is also present curettement is not to be performed, unless at the same time surgery for the relief of the tubal condition is to be carried out. Hemorrhage is the only indication for a curettage. It is not to be performed with the idea of cleansing the uterus of gonorrheal disease; if gonococci can be demonstrated in the cervical discharge, a curettage can only harm the patient.

A leukorrhea of gonorrheal origin indicates that the chief infection lies in the cervical canal and a curettage would only make the patient worse. Intra-uterine applications of caustics or other destructive agents are unsurgical and provocative of harm. Time is an important factor, since many cases of uterine infection progress to a cure despite insuccessful treatment. Many cases may require surgery, but time is of first importance.

The Treatment of Salpingitis and Ovaritis. Absolute rest in bed and quiet are the principal therapeutic agents during the acute stage. Although pyramidon and acetylsalicylic acid help greatly in the control of the pain, which is severe, opiates are usually necessary to supplement their action. The bowels should be moved by laxatives instead of enemas because of the danger of proctitis, and because harmful pressure on

incompletely closed tubes may lead to a leakage of pus. The practice of purging such patients is harmful, since it distrubs rest, increases pressure and weakens the patient. Examination should be very gently performed and limited to absolute necessity, since exacerbations in temperature and pain frequently follow them. Douches given during the acute stage are more often followed by harm than by good and should be held in abeyance until adhesions are formed.

Abundant easily digested food is necessary, if food is tolerated; the appetite should be encouraged, and better sleep induced.

The onset of the infection is usually stormy, but improvement occurs rapidly, the fever tends to decreasd after three or four days and the pain lessens. If at the end of a week the fever remains high and pain persists, there may be found definite palpable swellings of the appendages. If the patient is not improving, these swellings should be drained vaginally, care being taken not to traverse the peritoneal cavity. The early drainage of pus allows early resolution and limited the destruction of tissue. Cases so drained are less often in need of subsequent surgery, and more frequently progress to complete anatomical cure. Of course, cases which are getting well without surgery should be let alone. Abdominal surgery is too often done during the acute and subacute stages of the disease. The patients run more danger from these operations than they do from the disease, since general peritonitis is a rare complication of gonorrheal salpingitis and is too often a termination of these operations.

If the pain and swellings persist after the temperature has subsided, then douches should be given. Icthyol 5 per cent. in glycerin applied on tampons in the vault of the vagina is a valuable agent in hastening resolution in the inflamed appendages.

If pain persists after leukocytosis has disappeared, much relief can be had by the use of dry heating of the pelvic region by some of the various special cabinets arranged for this purpose.

As long as progressive improvement occurs the patient should not be operated on and the practice of operating on such patients because they have abnormal anatomy should be discouraged. It frequently happens that even big bilateral swelling not only progress to an anatomical cure, i. e., disappearance of the swellings and a return of the organs to normal palpatory findings, but also to a physiological cure as shown by the occurrence of pregnancy. Where exacerbations of acute difficulty occur or where there is an important residue of pain or menorrhagia after weeks or months have elapsed, and where these conditions are more appropriately treated.

Ophthalmia Neonatorum. Willaim Weston Jr. in the J. of the South Carolina Medical Association says that gonorrheal ophthalmitis can be prevented in new born by the use of Crede's method of instilling 2% silver-nitrate after birth. The incubation period is 12 to 48 hours. After the 10th day the infection is secondary. When babies are born of mothers

who have had gonorrhea the vagina as well as the eyes should be treated immediately after birth because the fingers may be the connecting link between gonorrheal vulvo-vaginitis and gonorrheal ophthalmitis.

By far the most important affection of the conjunctiva is the so-called ophthalmia neonatorum, if for no other reason than that is responsible for from 20 to 30 per cent. of the (unilateral and bilateral) blindness in all countries. About one-fourth of the pupils and inmates of our blind schools, hospitals and asylumns are there because of this infection of early infancy.

This acute inflammation of the conjunctiva, which is usually due to gonococcic infection, begins to show itself on the second or third day after birth. The symptoms are about the same as in gonorrheal conjunctivitis in the adult, except that the process is less severe and the corneal complications less frequent. There is first a redness of the eyelids and a mucopurulent discharge. Slight conjunctival hyperemia is soon succeeded by great swelling of the lids, chemosis and profuse purulent discharge. One eye is generally infected first, and if promptly and thoroughly treated the process is much less severe in the second eye. There is great swelling of the retrotarsal folds, so that sometimes the upper lid becomes spontaneously everted when the child cries, and the fornix appears as a red, suppurating mass resembling granulations.

Inoculation by the gonococcus occurs either during the passing of the child through the maternal passages, or shortly

after and, in a few cases at least, in utero, since the disease was present at birth. When labor has been slow, and especially in face presentations, infection is much more common.

The diagnosis of ophthalmia neonatorum should present no difficulty. Any redness or discharge about the eyes of an infant occurring during the first four days after birth is to be regarded as of gonococcic origin unless a bacteriologic examination shows it to otherwise.

While it is a serious disease, if recognized in the very beginning and properly treated, few eyes will be lost, although a small nebula often remains on the cornea. On the other hand if the case is not seen early, or if improperly treated, full 80 per cent of the eyes affected will end in blindness, due to sloughing of the cornea.

Quite early after Neisser's discovery of the gonococcus it was recognized that in many cases of ophthalmia neonatorum this organism was not to be found. And it was observed that these cases, though often beginning acutely, commonly took a comparatively mild course, with little danger to the cornea. The incubation period of these cases was found to be somewhat longer than that of the gonococcal cases. In a varying proportion of them organisms such as the pneumococcus, staphylococcus aureus, etc., were found and held to be causative. Still a considerable proportion of the attacks were left unexplained.

Treatment of Ophthalmia Neonatorum.--While every pediatrician should be well informed as to the usual routine therapy of this serious infection yet there is no disease

sac free from pus. There should be both a day and night nurse, as it is of the greatest importance that the eye be cleansed as frequently as possible while the purulent discharge is excessive. The cleansing may be done by various methods: Mopping up the pus with absorbent cotton and washing the cul-de-sac with boric acid solution by means of a pipette, or by keeping the surfaces clean by a continuous stream from a fountain syringe, as advocated by some.

Prophylactic measures show more brilliant results here than in any other disease, and may now be mentioned. The use of vaginal antiseptics before birth lessens the danger of infection. Immediately after delivery the child's eye should be washed with bichlorid solution (1 to 8000), followed by the instillation upon cornea of one drop of a 2 per cent solution of silver nitrate. This procedure, known as Crede's method has proved to be of such distinct value in preventing gonococcal infection that in many countries its practice is made obligatory by law.

Geo. H. Thompson aggrees with those observers who believe that the mildness of gonococcal ophthalmis in the infant is explained by supposing that the mother confers a strong degree of immunity upon the child. He does not believe that the milder disease in the infant is due to the fact that the infection has long lain dormant until roused into activity, whereas in the adult it occurs at the height of an attack of acute urethritis, when the infective powers

of the nicro-organism are presumably greatest. The author regards cases which occur before the second day after birth as due to intra-uterine infection, and those after the tenth day, to secondary infection. He thinks that the corneal ulceration is usually caused by traumatism from the fingers, either of the infant or of the attendant. Hence (quite consistently), he advises, that in the treatment of the malady the baby's arms should be confined, so that he cannot reach his eyes, and in applying lotions, that the use of undines or syringes be avoided. There is another reason for not employing syringes, the danger of infecting one's own eyes, of which unfortunate casualty there have been a number of instances.

As regards treatment, silver nitrate is not used by Thompson, who depends upon 25 per cent. argyrol or 4 per cent. protargol. Despite the fact that some think lightly of its germicidal properties, Thompson has always been satisfied with argyrol in suppurative conditions about the eye. The eyes should be kept clean with boric lotion or normal saline. The slighter corneal complications are treated with hot fomentations, the local application of carbolic acid or of tincture of iodin, the operation of corneal section being reserved for the more serious cases. He does not believe in the application of either atropin or physostigmin.

He mentions a surprising fact reported by Derby, viz., that in a series of cases reported from the Massachusetts Chartiable Eye and Ear Infirmary 23 per cent, were unilateral.

This is very different from the experience in Europe, where most cases eventually become bilateral. Indeed, one English observer went so far as to assert that unilateral cases are never seen.

Comparing the results of cases treated in private and in hospital, according to Cheney, Thompson makes some interesting remarks. Among 116 babies treatee in the year 1909 at the Massachusetts Charitable Eye and Ear Infirmary only six became blind, and all of these were brought after ulceration was well established. On the other hand, in eight American cities, of 61 medical men, each of whom was confronted at least once during 1901 by a case of ophthalmia neonatorum 39, or over 64 per cent. neither asked at any time for expert help, nor transferred the cases to hospital, but "invariably tried their inexpert hands at restraining the disease which they had failed to prevent." These physicians treated 44 cases, and they failed to save the sight of nine babies. "For these physicians the best that can be said is, that they reaped the result of their own laxity in 20 per cent. of their eye cases; or, in other words, they failed to prevent blindness in every fifth case."

As showing the unwisdom of giving a definite prognosis, Thompson mentions a couple of cases, in one of which a corneal ulcer developed when discharge had practically ceased, and in the other where the baby, under similar circumstances as regards discharge, developed fatal meningitis.

Before discharging a case Thompson takes two negative smears at intervals of 48 hours. He mentions the circumstance that gonococci have been found in the conjunctiva 25 days after the eyes were apparently well, and 60 days after the onset of the discharge.

Thompson whole-heartedly advocates the use of silver nitrate, 1 per cent, as a prophylactic, although he mistakenly states that these drops were originally recommended by Crede. In point of fact, as well known, the Leipzig professor employed and advocated 2 per cent. silver nitrate.

The legislation in the various states regulating the report and conduct of cases of ophthalmia neonatorum has been studied, collected by Dr. Frank Allport of Chicago, Chairman of a Committee of the American Medical Association. Pamphlets embodying these exhaustive investigations may be had from the office of the Journal in Chicago.

<u>The Muller-Oppenhein Reaction</u>. The Muller-Oppenhein reaction is mentioned at this time because Doctor P. Rullens states that a persistent negative state of the Muller-Oppenhein Reaction assures a cure of gonorrhea and therefore bears this important relationship to treatmeñt. For a very thorough discussion of the Muller-Oppenhein reaction, the reader is referred to an article by P. Rullens in the Urol. and Cutan. Rev. Vol. 36:P 23-29, Jan. '32. Some of the conclusions in this paper are worthy of note. The Muller-Oppenhein reaction may be considered as specific, the readings being frequently

positive. The antibodies only appear in the blood on the 15th day after inoculation and the 8th day after the onset of the urethral discharge. Before their date the Muller-Oppenhein reaction is negative, even though microscopically the gonococcus is always found. When the infection passes the anterior urethra the intensity of the reaction, as well as its frequence, increases. One obtains 85.7% of positive results in acute prostatitis, 92% in epididymitis and 100% in the articular complication of gonococcic infection. In chronic infection of the anterior urethra one finds from 60 to 70% of positive results; in the course of chronic prostatitis 86.1%. Genital complications in women give 89.2.% of posittive readings. Cases free of gonococcus infection and syphils almost always give a negative Muller-Oppenhein reaction; some of them have given slightly postive reactions to the extent of 7.7%.

The gonococcic antibodies may appear in the cerebro-spinal fluid; nevertheless these give 7.1% of non-specific readings in patients free of gonococcic infection and syphilis

Two months after clinical cure, in 80% of the cases, the Muller-Oppenhein reaction changes its sign. A persistent negative state of the Muller-Oppenhein reaction assures a cure of the affections. The Muller-Oppenhein reaction merits more frequent application, it permits the explanation of the exact nature of certain visceral lesions as well as a latent gonococcic process.

Constitutional Treatment. Any conduct, food, or drink that increases the irritation of the inflamed region or regions in gonorrhea must, as in inflammations of other parts, necessarily increase the disease, prolong its duration, the thwart the ultimate object of treatment.

There is little difficulty in causing patients to submit to the necessary restrictions when they are made aware of the risks incurred by their infraction.

The depressing influence which clap exercises upon most minds may be due to the consciousness of being affected with an unclean disease, to the deprivation of sexual intercourse, and to enforced abstinence from alcohol. This, however, would not account for the depression so frequent in those who do not allow the presence of a clap, unless accompanied by painful symptoms, to interfere with their self-gratifications. The possible effect of gonococci toxins directly upon the nervous system may, when better understood, give the explanation.

If a patient with gonorrhea were to withdraw from all entertainments during the disease, he would necessarily brood over the cause of his ostracism and its consequences. This would accentuate the mental depression. He should therefore seek diversion, such as society, theatres, etc., offer, but most postively avoid people, scenes, exhibitions, and literature that could evoke lubricious thoughts.

There is no reason, during gonorrhea, for not taking a daily bath; on the contrary, it is necessary for the purpose

of maintaining the patient's resistance. But several precautions in bathing are absolutely imperative. Before bathing, the patient should urinate, dress the glans with cotton soaked in mercuric bichloride 1:6,000, or boric acid four per cent., and cover the entire penis with a well-fitting condom, to be worn throughout the bath. This is the only safe manner in which gonorrheal pus can be prevented from mixing with the bathing water and possibly adhering to the sides of the tub, with all the danger to the eyes of the patient, and to the eyes, vagina, or rectum of another who may use the bath-tub after him. While no one, even in health, will rely upon the care of servants to cleanse a bath after he used it, the gonorrhoeic must be specially cautious in this regard. It would never be an excess of conscientiousness if the patient scrubbed the entire bath-tub personally with brush and strong soap, using boiling water into which has has dissolved two ounces of corrosive sublimate, for a tub capacity of twenty-five gallons. Following this, the hot water should be allowed to run again until the tub is entirely filled, to rinse it after the scrubbing. Even those who live in bachelor apartments and have their individual baths should be instructed to this for self-protection.

After the bath the condom should be removed at once, and thrown into the water-closet or preferably burned.

The gonorrhoeic patient should sleep on a hard mattress with light coverings, lest the heat of either provoke erections, with their determination of blood to the inflamed

region, and possibility of chordee. As erections are not likely to occur while the patient sleeps on his side, it will be well if he ties a towel around his abdomen with a hard knot immediately over the spine. Should he turn on to his back during sleep, the pressure of the knot will either awake him or cause him to return to his side without disturbing his sleep.

With a view to diluting the urine so that it may prove less irrating to the urethra, diuretics and diluents of all kinds are advised. The only diluent of any value is pure water in very large quantities, as a gobletful every two hours or every hour.

All alcoholic beverages must be strictly interdicted, unless the patient is in the habit of using them to such an extent that his appetitie would suffer from the deprivation. Then a glass, or even two, of light claret may be allowed at meals. But beer, white wine, champagne, whiskey, and brandy must be positively forbidden.

Many patients assure their physician that they have known men with very acute gonorrhea to drink heavily for a long time and thus cause the clap to disappear. Some will relate this as a personal experience in a previous attack. This statement deserves all the allowance physicians must make for the curious ideas that in some manner have forced themselves upon the laity. The fact remains that the patient who alleges that he "drank away" a previous clap, or homestly thinks he knows of others who performed this impossible feat, is then under treatment and continues under

it until he is well. Meanwhile he abstains from fantastic efforts to cure the disease with alcohol in any form.

Unless the patient has fever, he should take sufficient exercise to keep himself in good condition. Walking, driving over smooth roads, rowing, and such outdoor sports as will give him gentle exercise are certainly recommendable, not only for their physical but also for their mental effect.

Horseback riding must be positively forbidden during gonorrhea, as they expose the testicles and prostate to vibration at least, or small concussions, if not severe injury, inviting extension of the disease to these organs.

If a patient with gonorrhea has not a disturbing elevation of temperature, he certainly requires sufficient food to keep him as well nourished as possible, to aid him in resisting the microbic invasion. In this quest all articles difficult of digestion must be avoided, as must all food that for any reason disagrees with the patient.

When acute gonorrhea is not accompanied by much elevation of temperature, and when no complication obliges the patients to remain in bed, this, together with reducing his food, would supply means for reducing his resistance to the microbic invasion.

Gin is mentioned separately because of the wide reputation it unjustly enjoys for beneficial effects in gonorrhea. While it acts as a diuretic, it irritates the kidney directly and the rest of the genito-urinary apparatus as much or even more than any other alcoholic beverage.

It is not shown at all that smoking or chewing tobacco exerts any unfavorable or favorable influence upon gonorrhea unless the patient uses tobacco to a depressing extent. Then, naturally, its use must be curtailed.

In considering the additional methods of treatment only the most efficient will be discussed.

Diathermy has been used with considerable success in acute gonorrhea and its complications. Treatment is based on the fact that the tissues are heated locally to 40 degrees C., which temperature is lethal to the gonococcus without being injurious to the tissue cells. It is claimed for this method that diathermy may destroy all gonococci in acute urethritis within twenty-four hours after the first treatment (110 degrees F., for thirty to forty minutes).

Metaphen, a mercuric germicide, is said to be nonirritating to the mucosa, in solutions strong enough to be bactericidal. In acute gonorrhea, it is used in a 1: 8000 solution and may be injected locally or used in the form of an irrigation. It has the advantage of being stainless.

Vaccines, Recent therapeutic progress has been made in the direction of utilizing the blood stream and the natural resistance of the body in the attack on the infectious process. The first of these indirect measures came with the employment of vaccines. Vaccines not only promote increased body resistance in the blood to attack the gonococcus and its toxins, but they also attack the bacterial organisms which have penetrated the glands and deeper layers of the mucosa and therefore are beyond the reach of medicating fluids. As

a constitutional aid to local therapy, vaccines are indispensable, particularly in cases in which there is a sluggish response to local measures. The most satisfactory vaccine is that which can be given in maximum dosage without producing toxic effects, which does not produce a violent reaction and which most quickly stimulates the production of the greatest amount of specific antibodies. A mixed polyvalent vaccine is (Mulford) most useful as a routine measure; autogenous vaccines have not been of much value.

Protein Therapy The same ends have been sought in the introduction of foreign protein therapy. Sterilized or boiled milk, typhoid vaccine, turpentine and other protein substances are injected intramuscularly or subcutaneously. The reaction is a biologic response of the body, The natural resistance of which is increased by these measures. This is shown by the increased leucocytosis which follows these injections.

Boiled or sterilized milk is most frequently used, especially in Germany. After being permitted to cool to room temperature, 5 c.c. are injected into each buttock avoiding blood vessels. Pain is alleviated and the inflammatory process quickly subsides.

Turpentine also has been frequently used in the form of a 20 per cent. emulsion in olive oil; 0.5 to 1 c.c. is injected in the buttocks every other day. These protein injections are especially efficacious in the complications

of acute gonorrhea.

A combination treatment of milk and vaccine has been employed in Europe with striking results. Milk is injected into the buttocks as already described and an antistaphlococcal vaccine into the lower abdominal wall, in equal volume. It is maintained that the result of this treatment are far superior to those obtained by the standard measures. Exceptionally favorable results have followed its use in acute prostatitis and epididymitis.

Autoserotherapy has been highly recommended. It is said to exert a remarkably sedative action on the inflammation; in the presence of complications it quickly diminishes the pain and inflammation. The technic is quite simple: A few c.c. of blood are drawn off and incubated; of the resulting serum 0.5 to 1 c.c. is injected instramuscularly every few days.

Intravenous Therapy. For the direct attack on the infectious process through the blood stream, intravenous therapy has attained considerable vogue, though its ultimate therapeutic status is far from certain. It appears that the injection of chemical substances into the blood acts somewhat like a protein injection and that the toxin effect on the bacteria is secondary and not direct. Dale, studying the chemotherapy of the new antiseptics thus employed, suggests the following possibilities of their method of action: That they do not kill the parasites immediately, but modify their virulence or lower their

resistance to the body's natural defenses; that they form in the body some directly toxic products either by modification of its structure or by its union with some tissue component; and that they have an affinity for certain cells of the host's body, leading to the formation of a depot from which the curative substance is relieved.

The most prominent of these substances is Mercurochrome 220. It was first used as a local irrigation with some measure of success. It has a marked penetrating power, which is made evident by its intense staining qualities. Mercurochrome has found its greatest field of usefulness in gonorrhea as an intravenous injection. It has been successfully used in about 60 per cent of acute infections and their complications, according to Young and his coworkers. Young regards the failures as having been due either to insufficient treatment or to the early development of reactions which prevented continuation of the treatment.

On the other hand, Braasch and Bumpus, reporting from the Mayo clinic, believe that its toxicity is the greatest objection to its routine use intravenously. Severe reactions marked by prostration, chills and dysentery, were common in their experience. Two patients thus treated, died; on necropsy in one case, toxemia was considered the probable lethal factor in the absence of any other evident cause of death.

Those who advocate its use, do not recommend it as a substitute for the silver salts, but as an adjuvant to local

treatment. They believe that mercurochrome given intravenously attacks and destroys the gonococcus in the tissues of the body, but the bacterial organisms on the surface of the urethra seem to escape its influence. To combat these surface organisms, the local use of the silver salts is necessary.

Mercurochrome is best given intravenously in a 1 per cent. solution, at 48 hour intervals, the granular form being dissolved in warm, freshly distilled water. This drug is excreted in large quantities by the kidneys and also secreted through in prostate, seminal vesicles and other glands of the genital tract. It therefore comes in direct contact with the affected areas through the blood stream and the urine. Its eventual place as a standard antigonococcal therapy still is undetermined, but there can be no doubt of its definite value in a certain proportion of cases. Recently, a method of treatment has been advised in which the action of a nonspecific protein and sugar solution has been employed to increase the efficiency of the mercurochrome. In a series of twenty-five cases treated by this method in the U. S. Navy, it was reported that three injections were found to be sufficient in the average case to cause disappearance of the discharge and to clear the urine; patients with complications required one or two more injections to clear them up; the sick days ranged from six to ten days; the results obtained were extremely satisfactory.

<u>Acriflavine</u> intravenously also is strongly recommended, particularly in France where it was first used in this

manner. Five mils of a 1:50 solution in distilled water are injected three times weekly and less frequently after that. Intra-urethral medication is considered unnecessary. It is said that excellent results have been attained through this method.

Herrold and Culvert report that the local use of neutral acriflavine in gelatin has given results superior to any other method. There is a lower percentage of complications and in the uncomplicated cases there is a marked reduction in the duration of the disease. There is also evidence to show that there may be less late or subsequent gonorrheal pathologic changes with this method of treatment.

For internal medication, it is administered in the form of enteric coated tablets, in dosage of ½ grain, three times daily. It is said to be particularly effective in posterior urethritis as an internal antiseptic and urinary sedative.

BIBLIOGRAPHY

1. F. Berndt, Novoprotin, Value in Prevention of Complications, Med. Welt 6:782, May 28, '32.

2. H. E. Bordenwerper, Infection of Bone, J. A. M. A. 94:1230-1231, April 19, '30.

3. J. B. Bernstine, Gonorrheal Disease in Children (female) and its Treatment, M. J. and Rec. 135:290-292, March 16, '32.

4. T. N. Black, Surgical Therapy of Acute Epididymitis, Tr State M. J. 4:765, Dec. '31.

5. C. J. Bucher, When is Gonorrhea Cured, Pennsylvania M. J. 35:690-691.

6. L. C. Dubois, Complication and Sequels of Gonorrheal Urethritis, Prevention and Treatment, Tr. Chicago Urol. Soc. 1:37-42, '31.

7. E. E. Evert and R. D. Herrold, Local Vaccination in Male, Tr. Chicago Urol. Soc. 1:43-49, '31.

8. R. Feilchenfeld, Gonovitan (Gonococcic Vaccine), Med. Welt 6:781, May 28, '32.

9. A. G. Fleischman, Diathermy as Aid in Endocervicitis, Arch. Phys. Theraphy 13:207-213, April '32.

10. H. E. Foster, Tonsillitis, J. A. M. A. 94:791-792, March 15, '30.

11. G. Greenberg, Present-Day Status in Male, Urol. and Cutan. Rev. 36:509-515, Aug. '32.

12. R. D. Herrold, Debatable Questions on Management in Male, Urol. and Cutan. Rev. 36:441-448, July '32.

13. A. Jacoby, Unreliability of Laboratory Aids in Women, Am. J. Obst. and Gynec. 23:729-735, May '32.

14. J. G. Jones, Pyelonephritis, J. Missouri M. A. 29:297-300, July '32.

15. W. P. Jordan, Acute Gonorrhea in Women; Facts and Conditions, J. M. A. Georgia 19:196-200, May '30.

16. H. M. Kauner, Apparatus for Application of Heat in Female, California and West. Med. 36:344, May '32.

17. E. E. Kessler, Infection Kidney Pelvis, Am. J. Surg. 17:189-193, Aug. '32.

18. S. Kitamura and M. Motchata, Epididymitis, J. Orient Med. 16:67, May '32.

19. M. M. Mehcow, Acute Gonorrheal Urethritis, New York State J. Med. 32:955-961, Aug. 15, '32.

20. P. Mulzer, Determination of Definite cure, Med. Welt 6:771-774, May '28, '32.

21. J. O. Oliver, Complement Fixation Test in Relation to Gonococcus, J. Hyg. 29:259-272, Dec. '29.

22. M. Ormhn, In Female from Public Health Viewpoint, Texas State J. Med. 25:663-666, Feb. '30.

23. I. N. O. Price, Fixation Test; further Improvements in Technic Resulting in Increased Sensitivity, Path. and Pact. 35:635-636, July '32.

24. J. H. Von Paurtales, Control and Treatment of Vaginitis of Infants, Arch. Pediat. 49:121-125, Feb. '32.

25. W. S. Pugh, Physiotherapy, Physical Therapy, 49:445-451, Dec. '30.

26. G. Rivelloni, Therapy Acridine Dye and Vaccine Combined, Rev. sud-Am de endocrinol. 15:277-292, April 15, '32.

27. P. Rullens, Muller-Oppenhein Reaction; Clinical and Diagnostic Importance, Urol. and Cutan. Rev. 36:23-29, Jan. '32.

28. J. Snohan, Diathermy, New Method, Physical Therapy, 49:451-457, Dec. '31.

29. A. C. Surber, Jr., Venereal Disease Problem in United States; Preliminary report on Results of Various Methods of Treatment in Acute Gonorrhea, U. S. Nav. M. Buel. 30:610-623, Oct. '32.

30. H. L. Wehrbein, Tissue Reaction to Antigonorrheal Drugs, J. Urol. 28:233-246, Aug, '32.

31. R. K. Wemack, Management of Acute Complications in Male, Tri-State M. J. 4:785, Jan. '32.

32. W. Weston, Jr. Vulvo Vaginitis and Ophthalmitis; three cases, J. South Carolinia M. A. 28:56-57, March '32.

33. T. J. Williams, Diathermy in Cervicitis and Urethritis, Am. J. Obst. and Gynec. 23:575-578, April '32.

34. J. N. Vander Veer, Pure Gonococcal endocarditis, with Death, Urol and Cutan. Rev. 53:815-817, Dec. '39.