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Gonorrheal infections of childhood

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GONORREAL INFECTIONS OF
CHILDHOOD

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Presented to the Faculty of the University of Nebraska in partial fulfillment of the requirement for the Degree of Doctor of Medicine.

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INTRODUCTION

In spite of the attempts by various public health organizations to disseminate literature in regard to venereal diseases, gonorrhea remains second only to measles of the contagious diseases afflicting the population as a whole. Gonorrhea in children is not a rare disease, and as an old country practitioner once said to me, "Always remember, knowledge of diseases of children is applicable to adults, but that is not reversible." Consequently I have chosen this subject to acquaint myself more thoroughly with an all too common disease.

Gonorrhea in childhood is found largely in the female as an infection of the lower genital tract. The term, vulvovaginitis, has been chosen to describe this infection because of common usage only, because the term, as pointed out by Schaufler and Clifford, and Notes is misleading as far as the pathology is concerned. This treatise has been confined largely to this subject, but ophthalmia neonatorium and urethritis have been considered in a very general manner.
HISTORY

The exact period at which gonorrhea affected man is not known. It was well known in 300 B.C., and was evidenced in classic writings by Hippocrates, Aristotle, Seneca, and Plato. References are made to it in the Old Testament in the book of Leviticus 15, 2-3 (about 1500 B.C.), "Speak unto the children of Israel and say unto them, when any man hath a running issue of his flesh, because of this issue he is unclean". Celsus in his writings shows that it was a common disease in ancient Rome. Maimon (1240 A.D.) was the first to distinguish between the discharge and the semen. Later in 1500 it became confused with syphilis and it wasn't until 1837 that Ricord, a pupil of John Hunter, distinguished the diseases. His master had previously inoculated himself with pus from a gonorrhea case but which, unknown to him, had syphilis also. He soon developed gonorrhea and later a chancre, and thus falsely concluded that the "poison" was the same for both diseases. Hunter made other false conclusions in regard to syphilis and gonorrhea. In his observations made from inoculating himself, he said that secreting surfaces only were adaptable to gonorrhea while non-secreting surfaces only were adaptable to the chancre. He was unaware of
the parts affected also and considered the disease less severe in women than in men because of the fewer parts to be affected and the easy access to these parts. This was disproved by his student, Ricord, who first introduced the speculum and consequently showed the difficulties attended with female gonorrhea.

Paracelsus stated that gonorrhea was the initial symptom of syphilis.

It was believed by many that the venereal disease (gonorrhea and syphilis) came from the West Indies, but Jean Astruc (1754) disproved this. Giralano Frecastoso in 1546 believed the disease to be produced by some change in the planets and consequent air conditions, but he recognized the contagiousness of the disease.

It was not until 1879 that Neisser discovered the gonococcus and named the disease, that a definite bacterial discrimination was made.
ETIOLOGY

The etiology, of course, of infantile gonorrhea is the gonococcus. The organism was discovered first by Neisser in 1879 and described as being biscuit-shaped, occurring in two's or multiple of two, characteristically intracellular, non motile, and not forming spores. It was first cultivated by Bumm in 1885. It is cultivated best on human ascitic fluid, hydrocele fluid, or blood serum; is very sensitive to changes in temperature, and is a facultative anaerobe. The gonococcus ferments glucose but not maltose. It is not resistant to light, heat or drying, but will remain alive eighteen to twenty four hours on sheets or clothing in a moist state. Some writers go so far as to state that it will remain virulent for as many as forty nine days in a moist state upon bed linens, etc. The organism is extremely sensitive to most disinfectant solutions and particularly to silver salts, which fact is generally considered in successful treatments for the infection.

There are numerous strains of gonococci, some reporting as high as twenty five. An attempt has been made to group them, as has been done with the pneumococci, but unsuccessfully. Because of the fact that infantile gonorrhea is so seldom followed
by any complications and the well known sequellae of the adult infections, it was thought by many observers that there must be a difference in the organism causing the two types of infection. Louis Pearce came out in 1915 with a report that there was a difference between the adult and infantile variety, which he claimed gave different agglutinating reactions. Torrey, Wilson, and Scudder separately have been unable to corroborate this finding, and it is generally conceded at the present time that the same organism that attacks the adult is also responsible for the infections in children.

The gonococcus has been confused with many organisms, but most frequently with the Micrococcus Catarrhalis. This confusion is most often met with infections of the eye. The characteristic symptoms and history with the finding of intracellular, Gram negative diplococci in the discharge usually is sufficient to make a positive diagnosis. If there is question, cultivation is the only positive means of differentiating the two organisms.
EPIDEMIOLOGY

The vast majority of cases of infantile gonorrhea is found in hospital epidemics and among the poor, uneducated classes in the congested districts of the larger cities. The original source of the infection is from the adult either by direct or by indirect contact. Direct contact by rape and sexual perversions has been found, as stressed by many writers to compose as high as thirty percent and forty percent of some series of cases. It is a hideous fact that the old superstition still prevails among some of the ignorant classes, particularly the dark skinned races, that if one with a gonorrhea comes in contact with a virgin, he or she will thereby become cured. This has been abundantly proven by such contact being made with no effort or any evidence of rape being present. However, indirect contact accounts for the greatest majority of cases. The child by sleeping with an adult who is infected, or by coming into contact with the discharge upon the bed clothing, or by coming into contact with discharge left upon towels or wearing apparel becomes infected. The toilet seat has been credited and discredited a great deal. Taussig in his article stresses the importance of the toilet seat, particularly in the dissemination of the in-
fection among school children. He argues that the height of the stool, and consequent contact which is unavoidable for the small children, provides a very adequate means of spread of the disease.

Beilin, in a review of ninety-one cases of specific urethritis in boys under fourteen, believes that the disease is contracted in the usual manner. He discredits soiled bed linen, toilet seats etc., although he admits it is a possibility. He impresses his position by saying "sexual incidents in childhood occur far more frequently than is generally assumed, the individual at puberty is not infused with any new sex powers" and further believes in a "concept of dynamic unity" that there is no abrupt change at the time of puberty. He also stresses the source of infection from adults to children by sexual acts of various forms including perversions.

Of course, indirect contact is the cause of the epidemics that occur in hospitals and children's institutions. The infection may be spread by inadequately sterilized diapers, bed linens, thermometers, bed pans, napkins, and innumerable other objects or by untrained and careless nurses or
attendants. Witherspoon points out that the absence of pubic hair, slight vaginal secretions, the undeveloped labia and cervical glands, and the sensitive vaginal mucosa play no little part in the spread of the disease. Doctor Clark stresses the rectal thermometer as one of the chief offenders in the spread of the disease. Most hospitals do not have individual thermometers and frequently have the old type of thermometer with the calibrations on the outside, these small grooves provide an adequate harboring place for the organisms and make it practically impossible to thoroughly sterilize. He suspects the enema tip also, that either by contamination of itself or by pushing the discharge which is bound to contaminate this area, into the rectum and thus producing a proctitis. These are of particular import because in hospital epidemics the male as well as the female children contract the disease and as noted by Clark, the boys almost invariably have a proctitis in the beginning.

The incidence of acute gonorrheal vaginitis is greatest during the winter and spring, less in the autumn and least in the summer. Blum is the only writer that made this observation, but Clark pointed out this variation in his series, which
corresponded very closely to Blum's. Clark noted also that the majority responded more favorably to treatment in the warmer months, that if a case were picked up in the fall it would persist despite the most rigid treatment until the spring and summer months.

Hospital epidemics are particularly distressing; the added expense, the long duration of the disease in spite of the most vigorous treatment, and the distressingly high percentage of recurrences, make this one of the most dreaded of contagious diseases. The finding of a single case is disturbing because in spite of the most rigid isolation, in a few days to a week or more, other cases begin to appear in the ward. Fortunately epidemics of this nature are becoming less common on account of the more modern hospitals and children's institutions follow very strict regulations of admittance. Such a regulation is stressed by Witherspoon. Every patient, particularly female patients, is isolated strictly for three or four days with vaginal smears taken each day before they are admitted to the general ward. As noted, in spite of such precautions, epidemics break out every now and then and cause considerable distress, as well as expense to the institutions.
In ophthalmia neonatorum, the palpebral and bulbar conjunctivae are equally involved, and particularly the fornix. If the disease progresses, it involves the corneal and by perforating it, causes a pan ophthalmitis.

The infection in male children is largely confined to the anterior urethera if treated promptly. It may extend to involve the posterior urethera, the prostate, the lymphatics of the penis, and the glands in the inguinal region.

The pathology of Vulvo-vaginitis, though, is a much disputed question. It is thought by some observers that the infection involves only the vulva and vagina, while others include the various glands and the cervix, and some the urethera. Hess reported from post mortem examination of a chronic case: "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."

J. H. Von Pourtales points out that Hess, Rubin, Leopold, Norris and Mickelberg state that the pathology is strictly and endocervicitis. He believes that this is true in the sub acute and chronic stages.
Schauffler and Clifford very aptly point out that Hess in his observations at post mortem did not say the cervix was involved and thus empty the endocervix, but carefully distinguished between the vaginal cervix and the endocervix.

Notes believes that vulvo-vaginitis is an incomplete term and uses urethro-vulvo-vagino-cervicitis which more fully states the actual condition present. Norris and Mikelberg believe that the Bartholin glands are attacked, but less frequently than in the adult, the infection being limited to the external portion of the ducts. They likewise believe the cervix and urethra are harboring places for the gonococcus the same as in the adult.

While again, Schauffler and Clifford very emphatically state that the glands of Skene, Bartholin's glands, and the racemous glands of the endocervix are immature in the female before puberty, and consequently do not harbor the infection. They point out that the vaginal walls are thin and coapted and have many crypts. Thus they form an ideal place for infection. They also consider the disease primarily vaginal and secondarily vulvar; consequently the term vulvo-vaginitis is incorrect.
Stein believes the cervix is a constant involvement and cites Rubin, Leopold, Norris and Mickelberg as having the same belief. The uterus, tubes, and ovaries are seldom invaded. The urethra, regularly, and the Bartholin's ducts and Skene's glands are more commonly infected than is generally admitted. Vaginitis is a constant symptom. The vulva, the labia, and the vestibule also appear a bright red. Inguinal glands may be swollen. The rectal mucosa is frequently involved, being red but not ulcerated or swollen.

It is easily conceivable that the urethra would become involved sooner or later in every case because of the approximation of this structure to the discharge, which is most profuse as some stage in practically every case. That the cervix is involved in every case may be true; however, that it is the seat of the discharge in those long drawn out chronic cases has been proven by many observers by the use of the endoscope.
SYMPTOMS

In the acute stage of gonococcal vulvovaginitis there is itching and burning of the external genitalia. Frequently there is a complaint of weight in the genital tract, probably due to the edema of the parts. Ardor urinea is an early and troublesome symptom. Redness and edema of the external genitalia is characteristic, the hyperemia extending to the inner sides of the thighs. The labia majora are swollen and coapt with glueing of the discharge at first. As the disease progresses, the discharge changes from watery to a cream like consistency and later to a greenish-yellow color. The odor of the discharge is offensive. There may be a mild fever in the very acute stage, which is practically the only constitutional symptom. This stage usually lasts from three to six weeks.

The chronic stage is characterized chiefly by the continued purulent discharge. There may be a loss of weight due to irritability and anorexia.

In specific urethritis of male children the incubation period is somewhat longer than in the adult because of the comparatively long prepuce. There is a greater susceptibility though because of the greater vulnerability of the urethral mucosa.
Pain is a very common symptom, which varies extremely in regard to severity in individual cases. Retention of urine is a common and may be a very distressing symptom. The discharge has the same progressive nature as that previously described in connection with the vulvovaginitis.

The symptoms of gonorrheal conjunctivitis are about the same as in the adult, except that as a rule they are less severe and corneal complications are less frequent. There is first a redness of the eyelids and a mucopurulent discharge. Later there is great swelling of the lids, chemosis and a profuse purulent discharge. If both eyes are infected, usually one is more severe than the other, the first infected. There is great swelling of the retrotarsal folds, so that the upper lid sometimes becomes spontaneously everted, the fornix appears as a red, suppurating mass. The conjunctiva is rough and uneven, giving the appearance of granulations. As the disease tends to recede under proper management, the swelling decreases and the discharge becomes less purulent and finally subsides all together, leaving the eye without complications.
COMPLICATIONS

In gonorrheal conjunctivitis the common complication is a corneal ulcer which usually results in a pan-opthalmitis with the result of blindness. Before the method of Crede was introduced so widely as it is today, it was estimated that from twenty to fifty percent of all blindness was due to this infection. At the present time it has been estimated that fifty percent of inmates in institutions for the blind are there because of this infection. However, at the present time many states have a law that the prophylactic measure of Crede be employed in every case, and where there is no such law, it is common practice. In spite of this precaution numerous cases arise every year with not a few of them resulting in either partial or complete blindness. The cornea may not go on to ulcer formation, but the progress arrested so that an opacity of mild or severe degree may result which may more or less inhibit the vision.

Campbell reports a case of prostatic abscess in an infant twenty-eight months old. In review he states that there are only fifty-two reported cases up to the time of his report in 1928. As noted previously, posterior urethritis, lymphangitis of the penis and inguinal adenitis may re-
result in untreated cases, but complications, as a rule, are very rare, especially as compared to the adult. Strictures may occur but are very infrequent.

Complications of vulvo-vaginitis also are extremely uncommon and are a characteristic of the infection in children. It has been suggested by some that sterility and dysmenorrhea may be a late sequellae of this disease. It has been pointed out by many writers that the probable reason for the lack of complications in children is the absence of menstration and the closed cervical os.

Dooley, in reviewing twenty cases picked at random from the John Hopkin's Hospital Dispensary of women over the age of twenty who had had vulvo-vaginitis at the ages between three and ten, reports, that seventeen of these had married, ten had borne children, two were pregnant, and two habitually had practiced contraception. Frank in reporting twenty six cases of women who had had vulvovaginitis in infancy found all had cohabited and all had borne children, but that one out of three had menstrual complications. Thus, these cases give a fair indication that vulvovaginitis does not produce sterility of itself but may have some influence upon menstrual difficulties.
Bernatine says that the ulceration of the vaginal mucous membrane with consequent plastic adhesions between the opposing surfaces is one of the most common causes of acquired gynatresia, though it is in itself of rare occurrence.

Gleich, reports a case of acute peritonitis in a girl age four, which proved fatal within twenty-four hours of the onset of the symptoms. No mention was made of the duration of the vulvovaginitis nor of the mood of infection.

Titus and Notes, reporting 260 cases, saw no involvement of Bartholin's glands and only one case of pelvic inflammation. Arthritis occurred in four percent but no proctitis, cystitis nor ophthalmia.

It has been noted by Clark in two epidemics composed of seventy seven cases that there was a considerable percentage of proctitis and that arthritis occurred rather frequently. He made the noteworthy observation that in every case of arthritis, the child also gave positive rectal smears. In these two epidemics there was not a single case of conjunctivitis. Since the conjunctiva apparently is so susceptible to gonorrheal infection this is remarkable, because certainly in small infants it would be most difficult to inhibit them from con-
taminating their eyes with the discharge. In his experience when conjunctivitis has developed in cases of vulvovaginitis, the infection is mild and responds very readily to just moderate local applications.

Stein, in a review of 188 cases found complications in thirteen percent. The following were his findings named in order of frequency, tubal infection, opthalmia, arthritis and proctitis, general peritonitis and pelvic peritonitis.

Recurrences occurred from seven to eight percent in some series and as high as twenty three to twenty five percent in others, however, most observers noted between a twelve and fifteen percent recurrences. As noted though, previously, the high percentage of recurrences may be due to difficulty in determining when a case is cured after it has reached the chronic stage. And acute exanthemata or upper respiratory infection may cause a flair up of the discharge and other symptoms and may account for some of the recurrences.
DIAGNOSIS

The diagnosis in the acute stages of infantile gonorrhea is comparatively easy. It is made upon the symptoms and by microscopic examination of a smear made from the discharge and stained by the method of Gram. The organisms are found in great numbers in the discharge at this stage. They are characteristically intracellular, never in the nucleus and are Gram negative. The technique of making the smear is of particular importance in vulvovaginitis. That advised by most writers is the following: the thighs are flexed and widely abducted and the labia held separated as far as possible with gauze by the nurse; a common sterile stick applicator with a few drops of collodion on the cotton to make it more adherent to the applicator, is inserted into the vagina, care being taken not to touch the labia; the applicator is then rolled, not smeared, upon a steril clean slide. The object of rolling the smear is not to break up the cells, which happens when it is smeared on and thus makes the diagnosis more difficult, the organisms appearing among cellular debris and not characteristically intracellular.

In the chronic stages the diagnosis is difficult and because of this many cases are pronounced
cured, and later are found positive, which may ac-
count for the large percentage of recurrences in
some series of cases. As stated by Zinseer, the
organisms are scarce in the discharge of chronic
cases and appear extracellular which confuses it
with various other organisms, thus rendering a
positive diagnosis difficult. Many observers
stress the cervical infection in the chronic cases
and advise the use of an endoscope, the smear be-
ing taken directly from the cervix. Others believe
that a smear of the cervix may be taken accurately
by the use of the stick applicator, the cotton be-
ing impregnated with collodion with less discom-
fort and no injury to the hymen. The former group,
though, maintain that there is slight discomfort
to the patient and the hymen seldom has to be sac-
rificed, the opening only dilated, in inserting
the endoscope. Nevertheless in chronic cases
smear examination is unreliable as pointed out
because of the scarcity of the organisms and if
found are extracellular. However by culture and
complement-fixation tests a more accurate dia-
gnosis can be made. Culturing of the organisms
is difficult and time consuming and fraught with
many opportunities for error. Most of the observers agree that the complement-fixation reaction is of little value in acute cases and has its only place in the chronic stages of the disease. It is noted by some that a positive reaction is present six weeks after the case has been proven cured by other methods. Sherman, Norton, Kilduffe, and Schwartz agree that the complement fixation reaction has a greater positive value than negative. They believe it is roughly positive in eighty percent of cases. Thus these two methods have their drawbacks, but are the best means available at this time.

The diagnosis of conjunctivitis is by smear examination, as the discharge contains many of the organisms. Grulee states the axiom that any redness or discharge about the eyes of an infant occurring during the first four days after birth is to be regarded as gonococccic until otherwise proven. It is also noted by others that the conjunctiva is rough, having a granular and uneven appearance in specific cases, which differentiates it from catarrhal cases which always appear smooth. These symptoms are only aids to the diagnosis, which as mentioned is based upon the finding of intracellular Gram negative diplococci in the discharge.
TREATMENT

The very multiplicity of the lines of therapy testifies to the inadequacies of treatment for infantile gonorrhea, particularly vulvovaginitis.

Cleanliness as stressed by all writers on the subject is the most important part of the treatment. It is the essence of every treatment. Clark relies upon this one thing almost exclusively and with enviable results. Granting cleanliness as the most important single thing in the treatment, there are innumerable substances advocated to aid in the treatment and just recently a very radical line of therapy has been added.

Bernsteine favors a metaphine ointment for the chronic stages and believes that cleanliness is about the only thing for the acute stages. The vagina is filled with a 1:500 proportion of metaphine ointment three times a week. His average time was ten weeks.

Witherspoon recommends treatment with a five percent mercuriochrome solution, as does Williams of Owas, also. He uses it with pressure to reach the crevices of the vagina. He believes that the reason for the treatment being so difficult is the smallness of the parts and the consequent difficulty in thoroughly treating them. His average hospital time was three weeks.
Schauffler and Kuhn advise the use of plain anhydrous lanolin, incorporating an appropriate concentration of any worthwhile antiseptic (they use one percent silver nitrate). They point out that the lanolin has a fluid affinity and makes it especially adaptable for use in this place. They support their line of therapy by x-ray evidence which shows total application to all parts by this method.

Maggiore reports seven cases of gonococcus vulvitis treated by: 1-20,000 potassium permanganate to wash off the discharge, then to dry the parts and to dust them with a thick layer of tannic acid, which is reapplied each time the child urinates. He reports a cure in one to three weeks with this therapy.

Gelhorn advocates the use of silver nitrate one percent incorporated in a base of fifty percent lanolin and fifty percent white petrolatum. The average duration of treatment was three to four weeks. In advocating this treatment he calls attention to the many lines of therapy, and notes the many fluid therapies which remain in contact with the inflamed tissue only for a short time, and consequently any germicidal action they may
possess is active only for a short duration of time.

Dorne and Stein substitute in the Gelhorn treatment one percent mercurochrome for the silver nitrate because they believe it is less irritating, less astringent, and equally efficient as a germicide.

Norris and Mikelberg recommend the use of a cystoscope in the treatment and diagnosis. They use one percent of oily Dakins solution. The duration of their treatment was twelve weeks with twelve percent recurrences.

Vaccines have been used for a number of years with varying degrees of success. The usual report is that at times excellent results are obtained, but at others they are nil. L.V. Blanco and N.M. Villazon say, "Autogenous vaccines have undeniable curative properties." In their experience it was possible with the use of vaccines to subdue, in a relatively short time, a disease which up to the present had tenaciously resisted all forms of therapy. This is based upon a series of eleven cases, ten of which were entirely cured.
Terwilliger reports forty two cases treated with stock vaccine. He noted an exacerbation of symptoms following the second or third dose, and that all clean cases given vaccine did not develop any symptoms although exposed over a period of seven months and advances this as an aid in the diagnosis of doubtful cases.

Williams notes that after prolonged treatment with one antiseptic with no apparent effect, a change to another drug will frequently clear up the discharge and render the secretions gonocococcus free.

R.M. Lewis has introduced an entirely new and radical line of therapy with the use of Theelin. He states the well known fact that vulvovaginitis cases clear up as the age of puberty is approached, this being due to a change in the epithelial lining.

The primary infection in adults of the vagina is practically unknown. It has been proven that Theelin will produce a stimulation to the vaginal mucosa and change its character, approaching the adult type which is resistant to the infection. Eight cases were reported in which hypodermic injections of 50 R.U. units of Theelin in the arm
and the leg were the only treatment used. In no case did uterine bleeding result from or follow the treatment with Theelin. Vaginal discharge disappeared in from one to three weeks. In a normal child the vagina is lined with a delicate squamous epithelium four to six layers deep, which after ten days of injections of Theelin is twenty-five to thirty-five or more layers thick. Lewis recommends frequent small doses rather than infrequent larger doses, and also advises caution until more is known about the hormone.

The treatment of urethritis in male children is very similar to that of adults. The use of potassium permanganate or acriflavine irrigations and mercurochrome or solutions of the various silver salts instillations. The dilutions are somewhat greater because of the sensitivity of the immature urethral mucosa.

Cleanliness and acriflavine, hexylresorcinol, mercurochrome or solutions of the various silver salts as washes are recommended for the proctitis.

The most important part of the treatment of ophthalmia neonatorum is the prophylaxis. Crede in 1880 instituted the procedure of washing the eyes with boric acid and instilling one or two
percent silver nitrate in every new born at the time of birth. This has been changed very little since that time. Some observers are definitely opposed to the use of silver nitrate because not infrequently it causes a chemical conjunctivitis, which may be severe and difficult to cure. Other men favor some of the silver salts as protargol and argyrol or acriflavine or mecurochrome. However, there are many very noteworthy men who insist that silver nitrate is the best solution and state that if the chemical conjunctivitis is treated with irrigations and not over treated, nothing may be feared from that source.

There are two lines of therapy advocated, general and local. Some observers favor a combination of the two while others believe only in the local therapy.

The general therapy is composed of keeping up the nutrition and general health of the child and the use of foreign protein injections. Redding has used various proteins; started first with diphtheria antitoxin, then cow's milk, and later aolin, and recently human milk. He believes aolin to be of more benefit in adults and human milk to give better results in infants. The human milk is taken under as nearly
aseptic conditions as possible, one cubic centimeter is given intramuscularly daily. It is not necessary to boil the milk. It causes no increase in temperature and there are no ill results. He found that at the end of seventy two hours in a cases where there was great swelling of the eyelids and much discharge, that the swelling was reduced markedly and the discharge was more serous, less purulent and contained very few organisms. The discharge though may continue for a week and the injections should be continued over this period of time. He combines this with local irrigations and applications to the eyes. He had no corneal ulcers develop which had not developed previous to the time this treatment was instituted.

Lazor, outlined in his article local treatment which is similiar with minor changes as given by most men. The eyes are irrigated with a warm solution of boric acid or saline every fifteen minutes, half hour or hour or two hours depending upon the amount of discharge. Ice compresses are kept on the eyes for the first twenty four to forty eight hours to keep the swelling down. Some men advocate hot compresses to take the place of cold compresses. He uses a one percent mercurochrome solution three or
four times daily and one percent silver nitrate once a day. The conjunctiva is wiped off carefully as the discharge indicates. Lazor advises also the use of milk injections in the more severe cases.

Ringle stresses the importance of having well-trained and skillful nursing care. This is mentioned by most authorities in connection with the local treatment. The treatment advised by him is very similar to Lazor's.

Mayou favors aqueous (1-10) as the best lotion for irrigations. He recommends acriflavine 1-1,500 of castor oil instillations following the irrigations. He also believes silver nitrate is not indicated during the stage of swelling but of great value in clearing up a case. He advises the use of protargol or acriflavine rather than silver nitrate as a prophylactic. He believes external canthotomy advisable in the early stages to provide better drainage. Quoting from his article in regard to milk injections, "Treatment by milk injections has no effect, and is very dangerous, as the rise of temperature lowers the resistance and is often associated with the onset of corneal ulceration."
Grulee advocates very similar treatment to that of Lazor. Ruthford's treatment is very similar also. He recommends the use of potassium permanganate beginning with 1-10,000 and increasing to 1-5,000 for irrigations. Parsons advises the use of atropine when haziness appears, but otherwise his treatment is very similar. May's treatment is similar also except the use of argyrol twenty-five percent and protargol ten percent for instillations. He also recommends the use of atropine if there is any suggestion of involve-ments of the cornea.
CASE REPORTS

Through the courtesy of Dr. Clark I have been permitted to report the following two cases. They have been chosen from an epidemic of twenty-six cases as typical cases with arthritic complications.

O-- female, born February 11, 1933, at an institution remained there until admitted to another institution on April 4, 1933. The following is a record kept at the latter institution. From the time of her admission she ate well, and gained one pound in five weeks. May 8th to 13th she ran a rectal temperature around 101. On May 15th it was noted that the baby cried a great deal. On May 21st, the right arm became red, swollen, and tender above the elbow. On May 23 an X-ray was taken and reported the finding of a possible osteomyelitis. May 29th a rectal smear was reported positive for gonococci. The arm was treated with dry heat one hour three times a day. Tap water enemas followed by instillation of heylresorcinol 50% solution three ounces twice a day for the rectum. There was a greenish pus and mucous in the stools and enema from the rectum at this time. This treatment was continued until July 3rd, the temperature ranging between 99 and 102 rectally. The swelling in the arm had lessened and there was no rectal discharge. There was no vaginal discharge at any time. On July 11th, the vaginal smear became positive. Boric acid solutions were used as external irrigations, twice a day and the vulva exposed to the sunlight twice a day beginning with one minute exposure and increasing the time. On July 25th both the rectal and vaginal smears were positive and the rectal treatments were resumed. The rectal and vaginal smears remained positive on August 25th but were negative on September 4th. The rectal smears remained negative after this, but the vaginal smears were positive on October 13th and again on December 18th. Occasionally between these times the report was doubtful on the vaginal smears. At the last of October the arm appeared normal; the child had good use of the arm; and there was no pain or swelling. There was occasional greenish vaginal discharge, but no fever or any evidence of arthritis. Within the last week (March 24, 1934) the child has had the measles and the report on the vaginal smears is doubtful.
F., male, born December 23, 1932 at an other institution was admitted to this institution on February 2, 1933. From admission to May 24th he ate well, and averaged 2-12 ounces weekly. His highest temperature during this time was 99.8 rectally. On May 24th his temperature was 102R., and it was noted the child cried long and hard. On May 30th the right hand became swollen red and painful. Hot magnesium sulphate packs to the hand were advised. On May 30th rectal smears were negative and dry heat was advised to the hand T.I.D. However there was a greenish pus and mucous in the stools and a treatment previously described instituted. June 5th the rectal smears were still negative, but the same rectal symptoms persisted. On June 9, the left knee became tender and swollen. On July 4th the rectal treatments were discontinued. July 6th the hand was apparently normal, but the knee remained about the same. The rectal smears remained negative until July 25th when there was a doubtful. Then on Aug. 2nd the smear was positive and treatment was resumed. The treatment was discontinued on Sept. 2nd, the rectal smear again being negative. The right knee had improved, the swelling decreased and the child was using it more. The smears have remained negative from this time to the present. The child is able to use the knee and hand and there is no evidence of any impaired function.

In each of these cases it will be noted that there was first a low grade temperature, followed by restlessness and irritability in the child, followed by evidence of joint involvement. Then later there was evidence of a proctitis which sooner or later showed up as gonorrheal in origin. There was no surgical intervention in either case and the joint returned to normal under ordinary local heat to the part and adequate treatment of the rectal condition.
CONCLUSION

Direct contact, by sexual perversions, attacks and incidents account for not a few cases of gonorrhea in childhood, especially among the older children. Indirect contact, however, by contaminated bed linens, toilet seats, rectal thermometers, enema tips etc., account for the majority of cases.

In the acute infections of the female only the vulva and vagina are involved, but in the chronic condition the cervix and urethra become infected also. Whether the various glands are regularly involved is a question.

Complications are unusual in all forms of gonorrhea in childhood. There may though, be minor menstrual difficulties as a sequelae of infections in females. Corneal opacities and ulcerations are due to poor management or treatment being instituted late in the course of the infection.

The diagnosis should be made only when Gram negative intracellular diplococci are found in the discharge. The complement fixation test has its place in the chronic stages of the disease, but then has more value when negative than positive.

Cleanliness in vulvovaginitis is extremely important and probably is the only result obtain-
ed by external irrigations or applications. Any suitable germicide incorporated in a base of fifty percent lanolin and fifty percent petrolatum and introduced into the vagina with pressure to reach the crypts is advisable especially in chronic cases. A change in the germicide may give good results in persistent cases. Vaccine therapy is rather doubtful but may have some beneficial results. The use of Theelin is too new to draw any conclusions, but offers a dramatic therapy based upon proven facts of pharmacology and physiology.

A combination of foreign protein and local applications in ophthalmia neonatorum should give the best results.

Surgery seldom, if ever, is indicated in specific arthritic conditions of childhood. It is advisable to take rectal smears in unexplainable arthritic conditions of childhood.
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