THE DIAGNOSIS AND TREATMENT OF CHRONIC GONORRHOEA AND ITS LOCAL COMPLICATIONS.*

BY

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It has, until recently, been the habit in this country to look upon gonorrhoea as a trivial affection, and only within the last few years have the severe and dangerous sequelae of this condition been recognized.

Neisser, the discoverer of the gonococcus, considers that gonorrhoea is the most widespread of all the infectious diseases, with the exception of measles, and that probably this disease is one of the most common causes of sterility, and his observations appear to be confirmed by other observers. Luys states: "There can be no question that uncured gonorrhoea is one of the most frequent causes of a declining birth-rate, that it cripples an endless number of men, and that it renders legions of women sterile." It appears to be highly probable that over 50 per cent. of the inflammatory pelvic troubles so often met with in young married women are due to gonococcal infection by the husband, who, to do him justice, is usually quite ignorant that he was not completely cured before marriage. It is a matter of great regret—indeed I feel inclined to put the matter more strongly and to say that it is a shame to our profession—that so many men are told that they are free from all infection, and are given permission to marry before any systematic, thorough, and scientific examination has been made on which such an opinion can be logically based. The average young man is not a blackguard, and if he were told by his medical man that after an attack of gonorrhoea he must not marry until repeated examination enables a clean bill of health to be given, and that if he does marry before such permission is received he will run a grave risk of infecting his bride, he will, in the great majority of cases, follow his doctor's advice.

I consider, therefore, that the responsibility of the prevalence of inflammatory pelvic conditions in young married women is shared equally between the doctor and the husband—indeed, in many cases the doctor is the more to blame. It behoves us, therefore, to remember that if we do not constitute ourselves the champions of the innocent wife and unborn children, we shall deserve to be considered their enemies. It is, however, only by a systematic and thorough routine examination that entails time, trouble, and skill that we are able to give an opinion that is of any real value, or to state with any assurance that cure has been effected.

Chronicity, or so-called latency of gonorrhoea, has a definite cause, and this cause can always be found if a systematic search is made for it. Criminals who are wanted by the police do not frequent the main thoroughfares, but frequent side streets and alleys; so the gonococcus may lurk unsuspected in the ducts and glands that surround the urethra along its whole length. A cessation of an obvious urethral discharge simply means that the main thoroughfare is clear, but is no evidence that all the periurethral ducts and glands are uninfected.

DIAGNOSIS.

For a proper examination it is almost essential that the patient, whether male or female, should be examined on one of the many examination chairs devised for this purpose.

Male.

In the male the routine examination should consist of:

Examination of Urethral Discharge.

As regards the amount, whether continuous or only morning drop; the colour, whether yellow, white, or blood-stained, and the bacteriology.

Examination of the Urine for Threads or Turbidity.

Many methods have been devised. The two which appear to be most reliable are Kollmann's five-glass

method and Luys's four-glass method. In the former the first glass contains the washings of the anterior urethra. Weak boracic lotion is used, and the anterior urethra is washed out with a syringe until the fluid is clear and free from threads. The second glass contains the clear syringe washing, and is used as a control. The urine is now passed into the third, fourth, and fifth glasses successively. If threads appear in the first glass but the urine in the third, fourth, and fifth glasses is clear, the case is one of simple anterior urethritis. The size, shape, and weight of the threads are of importance. If the threads are long mucous threads and float, they are the result of superficial catarrh of the urethra; whilst, if they are small and comma-shaped, and are suspended in the urine, they come from Littre's glands. If the third, fourth, and fifth glasses containing urine contain threads, post-urethritis is present; and if the threads are short, thick, and heavy, or comma-shaped, they come from the prostate. If all the glasses are turbid and the fifth glass the most turbid, cystitis is present.

When using Luys's four-glass method the urine is passed into four glasses successively. Luys considers that this method is sufficiently accurate for routine method of examination, and that it permits the differential diagnosis of anterior and posterior urethritis. He says, "If the contents of the first glass fail to cleanse the anterior urethra, those of the second, and *a fortiori* those of the third will do so; and if the fourth glass contains heavy flakes, while the second and third do not, or only contain a few, then the diagnosis of posterior urethritis is certain." After standing for half an hour in a cool place the urine of the glass containing threads or turbidity is centrifuged, and the centrifuged deposit examined microscopically for nature of cells and organisms found.

In the case of chronic gonorrhoea, the gonococcus is often very difficult to detect, and prolonged search is necessary. If the urine is turbid, some of the urine is treated with a little acetic acid, when the turbidity will disappear if due to phosphates.

Examination of the Urethra and Glands Connected with it.

If the lips of the meatus are stuck together, or show any discharge, a chronic inflammation of the urethra is probably present. Examination of the meatus and fossa navicularis is simplified if a small speculum is used. Paraurethral ducts and suppurating follicles must be carefully looked for, and a small blunt-pointed stilette may be of considerable assistance in this exploration. If acute inflammation of the urethra can be eliminated, and the urine in the first glass is not turbid, the anterior urethra should be examined by means of a straight metal sound or flexible gum-elastic bougie passed down it, and the whole length of the urethra carefully palpated for the presence of inflamed, thickened, or painful areas or stricture. The urethra should then be gently massaged on the sound, after which the anterior urethra should be washed out and again examined for pus and threads. In this way infection of any of the glands in the anterior urethra will be detected.

Cowper's glands should be now examined, and for this purpose the patient is placed on his back in the lithotomy position, and the first finger of the right hand passed into the rectum, its palmar surface forwards. The finger inside the rectum is then hooked forward first to one side and then to the other, and the thumb on the outside approximated to the finger in the rectum. A small tender tumour will indicate inflammation of Cowper's gland, which may be either unilateral or bilateral.

For the examination of the prostate and vesiculæ seminales, the patient stands, leaning forward, and the first finger is inserted in the rectum with the palmar surface downwards. The prostate is examined through the anterior wall of the rectum, and both its middle and lateral lobes massaged, and note is made of any tenderness. The bladder, which should previously be partly filled with boracic lotion, is now emptied, and the fluid examined for pus or threads. The vesiculæ seminales cannot usually be felt in health, but if enlarged or inflamed, will be felt above the prostate between the anterior wall of the rectum and the bladder. They should be examined at the same time as the prostate.

* Read before the Southern Branch of the British Medical Association.

The next step consists of examination of the urethra by means of the urethroscope. Luys, in his most interesting and valuable *Textbook of Gonorrhoea*,¹ says:

The urethroscope should be accepted nowadays as a common instrument for exploring the urethra for diagnostic purposes. It gives infinitely more accurate information than any other method of examination. For therapeutic purposes it gives the means of treating the lesions with astonishing precision and efficiency. It is indispensable in the treatment of chronic urethritis.

Before passing the urethroscope it must be ascertained by means of metal sounds that the urethra will admit the instrument, and if the lumen is not large enough, sufficient time must be devoted to the gradual dilatation of the urethra up to the required dimensions for easy passage of the instrument.

The condition of the mucous membrane in chronic urethritis has been classified under two heads—(1) soft infiltration and (2) hard infiltration. In the former the mucous membrane is swollen and red, and in the latter contracted and pale, one being a condition of hyperaemia and the other of sclerosis. The appearance of the mucous membrane in a condition of soft infiltration is that of an inflamed hyperaemic and swollen mucous membrane. The area affected may be small or large, and one or several patches may be present. The openings of Littre's glands and the lacunae of Morgagni all appear as little red points, and pus can be seen coming out of them. Papillomatous hyperplasia of the mucous membrane is often met with in the condition of soft infiltration.

In hard infiltration, which is a later step, and must always have been preceded by a condition of soft infiltration, the thickened and sclerotic patches, which are really the early stages of a stricture, offer resistance to the passage of the instrument. The mucous membrane is pale and anaemic; the epithelium is pale, but there may be little nodules or ulcerated surfaces, and the lumen of the urethra appears as an elongated funnel with rigid walls.

Female.

In the female a similar procedure is adopted, and consists of:

Examination of Vulval Discharge.

As regards locality, whether the discharge appears to come from Bartholin's glands, from the urethra, or from the vagina; the colour and quantity of the discharge; and its bacteriology.

Bartholin's Glands.

The glands are examined and palpated by means of one finger in the vagina and one on the outside of each labium majus. If no pain, tenderness, or swelling is felt, an attempt is made to express any pus which may be present, which is then examined bacteriologically.

The Urethra.

If on careful inspection there be any sign of pus, it is collected on a platinum loop, and examined bacteriologically. The follicles just within and around the meatus are also carefully examined. The next step should be that of milking the urethra. For this purpose the first finger, with the palmar surface anterior, is introduced into the vagina as far as it will go up into the anterior fornix. It is now gently pressed against the anterior vaginal wall and withdrawn slowly along the urethra, pressing gently, so as to express any pus. If a bead of pus is obtained, it is collected and examined.

Examination of the Urine.

Luys recommends the four-glass method, when in the female; a simple urethritis is shown by turbidity in the first glass, while the third and fourth glasses will contain clear urine. All the glasses will be turbid if cystitis is present.

Examination of the Cervix.

A vaginal speculum is passed and the cervix examined for any discharge, which is removed with a platinum loop and examined bacteriologically. Luys recommends that as a negative result is often obtained by this examination, a sterile cotton-wool plug should be introduced into the cervix and left for twenty-four hours, when it is removed and examined bacteriologically.

TREATMENT.

Gonorrhoea, being an infection due to a specific micro-organism, must be treated both generally and locally.

General treatment is carried out with the view of raising the resistance of the body to the attacks of the organism, neutralizing the toxins produced by the organisms, and increasing the bactericidal power of the host.

In local treatment the object is to kill and wash away the organisms from the foci in which they have established themselves, and to obtain the evacuation and drainage of pent-up infected material; and to allow the immunizing and curative fluids to complete the cure.

In all chronic pyogenic infections it is important that the patient should live as hygienic a life as possible. With chronic gonorrhoea, in which the only symptoms may be threads in the urine, it is not necessary to insist on complete abstinence from all alcohol; strict moderation should, however, be practised, and generally the least harmful form of alcohol is weak whisky and soda. Sexual excitement and exercise liable to produce irritation of the urethra, such as riding or cycling, must be avoided.

Great things have been hoped for from vaccine-therapy, but personally I have been disappointed in the majority of cases of chronic gonorrhoea and its complications. As regards the value of vaccine treatment in acute gonorrhoea, Major L. W. Harrison, R.A.M.C., with his very large experience, is of the opinion that a smaller percentage of patients who receive vaccine treatment develop complications and chronic gonorrhoea than those who have not received this treatment. Vaccine treatment may therefore be considered as of some value in regard to the prophylaxis of chronic gonorrhoea. It is also, I think, of undoubted use in gonorrhoeal rheumatism, but that condition is beyond the scope of this paper. Gonorrhoeal phylacogen has been shown by Major Harrison, who has investigated this remedy, to be of doubtful if any value in chronic gonorrhoea.

Besredka's sensitized vaccines have been well reported on by Dr. Cruveilhier of Paris, who considers that cases of chronic gonorrhoea have been benefited by them. The matter requires further investigation before any definite opinion can be formed.

I have only a small personal experience of the curative power of Nicolle and Blaizot's much advertised preparation "Dmagon"; though some cases have apparently been benefited by its use, I am not much impressed with its therapeutic merits. The method of preparation has not been disclosed, but the drug is stated to be free from toxicity, that it can be preserved indefinitely, and that cure is obtained in from three to ten days with from two to six intramuscular inoculations.

Chronic gonorrhoea is due to a combination of (1) chronic urethritis proper, by which I mean localized inflammation or ulceration of the urethral mucous membrane; and (2) chronic infection of glands connected with the urethra. No system of treatment is likely to be successful unless both these features are dealt with.

I divide the local treatment under two heads, the first being treatment directed for the cure of the urethra proper, and the second treatment directed to the cure of affected glands.

(a) Posterior Irrigation.

By this we mean passing antiseptic solutions into the bladder, from which they are returned in the normal way. The solutions of most value are:

Potassium permanganate (1 in 8,000 to 1 in 4,000).

Silver salts, particularly protargol and albargin (1 in 2,000 to 1 in 1,000).

Mercury oxycyanide (1 in 10,000 to 1 in 2,000). This should not be given if the patient has recently been taking iodides by the mouth, as severe cystitis and urethritis is liable to be induced owing to the formation of mercury iodide *in situ*.

Before the first two or three irrigations it is usually advisable to anaesthetize the urethra with a 1 per cent. solution of stovaine. Cocaine should not be used, as several cases of sudden death following its use have been recorded. The patient having emptied his bladder, about 10 c.cm. of 1 per cent. solution of stovaine is injected with a large syringe and retained in the urethra for about five minutes. Any form of irrigator can be used, the reservoir of which should have a capacity of at least two quarts. I use a Wyndham-Powell glass shield and nozzle, which is connected to the reservoir by rubber tubing. The reservoir

should be about 4 ft. above the patient, who should be lying on his back on the examining chair. The solution should be used at about body temperature, with the exception of protargol, which is easily decomposed, and so should only be used with distilled water and in cold solution.

The shield and cannula are held in the right hand, and the glans with the left. The nozzle is now inserted into the meatus and the urethra filled with the solution. The nozzle is now withdrawn and the fluid escapes. This manoeuvre is repeated until a pint of the solution has been used, when the anterior urethra will have been thoroughly cleansed. The nozzle is now kept in the meatus and pressed against it, so that no fluid escapes. The patient is now told to endeavour to make water in order to relax the sphincter of the bladder, and in the majority of cases the fluid will then flow easily into the bladder, and it is allowed to flow until the patient expresses a desire to empty his bladder. About two quarts of solution should be used, and the posterior irrigation should be given about three times a week. If the patient contracts and resists so that an easy flow is not obtained the irrigation must be discontinued.

(b) *Injection by Guyon's Method.*

A 1 to 3 per cent. solution of silver nitrate is employed. A hollow olivary-pointed bougie is used, the openings being behind the heel of the olive, so that the stream is projected forwards. The bougie is introduced into the bladder, and the nozzle of the syringe fitted to the end of the bougie. The bougie is now slowly withdrawn, and at the same time the piston of the syringe is depressed, so that the urethra is filled with the solution. At the same time the thumb and forefinger of the left hand press the lips of the meatus against the bougie, so that no fluid is allowed to escape. The solution should be retained for five minutes.

Considerable local reaction may follow this method of treatment, which should not be repeated at shorter intervals than one week.

(c) *Ionization of the Urethra.*

Silver and zinc salts are used in a solution of $\frac{1}{2}$ to 1 per cent. of silver nitrate and 2 per cent. of zinc sulphate. The positive electrode consists of a hollow vulcanite bougie pierced with holes by which the fluid containing the salts in solution is introduced into the urethra. The large negative or indifferent electrode, which usually consists of lead covered with moistened flannel, is placed on the abdomen or thigh. The current should be slowly worked up from 1 to 10 milliamperes, according to the tolerance of the patient, and the current should be applied for about a quarter of an hour. The treatment should be given not oftener than once a week.

(d) *Dissolvent Medicated Bougies.*

In these the vehicle is cocoa butter or gelatine with which the drug to be applied (zinc sulphate, silver nitrate, etc.) has been mixed. The only ones I have used are those sold under the names of "Sil-Mer-Zincs" (Mitchell's) which consist of a mixture of silver, mercury, and zinc salts in a gelatine and glycerine basis, and are supplied with little linen hoods. They should be inserted on retiring to rest, and the linen hood, which contains a little cotton-wool, should be tied over the glans. The bougie will then slowly dissolve, and the medicament will remain in contact during the night and be washed out when the patient passes water in the morning.

(e) *Heated Bougies.*

Major L. W. Harrison, R.A.M.C., has reported the results of the treatment of a series of cases by means of Valentine's water-heated bougie; he considers the results he has obtained very promising. Major Harrison² uses the following technique:

An atropine suppository gr. $\frac{1}{2}$ is administered to the patient the night before and again on the same morning. Immediately before the bougie is passed, his urethra is irrigated in the usual manner. He then lies on a couch, and is adequately protected with a waterproof sheet. The sterilized and lubricated bougie is connected by its inner tube to a rubber tube leading from an irrigator which is filled with water at 114° F., and placed about 18 in. above the couch. This rubber tube is provided with a clip; to the lateral tube is attached another short

rubber tube to lead away the water to a conveniently placed bucket. The bougie is then passed into the bladder, and the clip opened to allow the water to flow from the irrigator down the inner tube of the bougie and back by the outer tube to the outlet. The temperature of the water in the irrigator is gradually raised to 125° F. by putting more hot water to it, and at this temperature the water is allowed to flow from the bougie for twenty-five to thirty minutes.

Treatment of Infective Glands.

The three methods employed consist of the massage of the glands connected with the urethra, dilatation of the urethra, and destruction of foci in and around the urethral wall by cauterization or incision.

For massage of the lacunae of Morgagni and Littre's glands a straight anterior urethral metal sound is inserted, as large as can with comfort be admitted into the urethra, and the urethra massaged round it. After withdrawal of the sound the anterior urethra should be irrigated.

Massage of the prostate and vesiculae seminales has been dealt with already. A second variety of prostatic massage can, however, be used with advantage. In this case, having partially filled the bladder with boric acid solution, a curved metal sound, as large as possible, is passed, and the prostate is massaged against the sound by means of the finger in the rectum. More efficient massage can thus be obtained, as the sound gives something firm to press against. Only gentle massage must be employed.

The technique of the massage of Cowper's gland has also been given previously.

The object of dilatation of the urethra is to distend the mucous membrane and to squeeze out any small collections of infected material that may have accumulated in the glands or ducts of the mucous membrane.

For dilatation of the anterior urethra, short straight metal sounds are used, and for the posterior urethra long curved ones. The patient empties his bladder, which is then partially filled with boric acid solution. When treating the anterior urethra, the largest sized sound which can be admitted with ease and comfort is found, and this is taken as the first of the series. Not more than three sounds are passed at each visit, and there should not be more than three dilatations a week. The anterior urethra should be dilated up to No. 20 English size. As, however, the penile portion of the urethra is narrower than the prostatic, it is obvious that complete dilatation of the prostatic urethra cannot be obtained in this way. We must, therefore, after dilating the anterior and posterior urethra as much as possible with a curved metal bougie, use Kollmann's dilator. In this instrument the dilating portion is collapsible, so that it can pass through the penile urethra, and on reaching the prostatic urethra, can be opened out by means of a screw in the handle. The amount of dilatation is accurately measured by a dial which is worked in connexion with the screw. Dilatation should be very slow, and pain is an indication that dilatation has proceeded far enough for that day. This method of dilatation should not be applied more than twice a week, and when the maximum dilatation has been reached at each sitting, the dilator should be left in the urethra at the fullest dilatation for five minutes before it is collapsed and removed. Kollmann's dilator is usually covered with a rubber sheath before introduction, in order to prevent nipping of the mucous membrane between the four blades of the dilator when the instrument is closed for withdrawal from the urethra. As in the case of dilatation of the urethra with the metal sound, the bladder is partially filled with boric acid solution before dilatation takes place, and after dilatation the bladder is emptied, thus washing away any debris which may have collected as a result of the dilatation, and which may then be examined cytologically and bacteriologically.

For the destruction of foci in or around the urethra an electric cautery is used in conjunction with the urethroscope, a fine platinum-pointed cautery being introduced through the urethroscope tube, and the operation being performed with the assistance of the urethroscope lamp. The cautery can be used for opening small abscesses, for cauterizing local ulcerated areas, or for the removal of proliferation of the mucous membrane. Luys has found this method of treatment safe and free from complication, and has only encountered haemorrhage twice out of many hundred cases, and this haemorrhage was easily controlled by irrigation with very hot water. He recommends that

after canterization a posterior irrigation with 1 in 4,000 mercury oxycyanide should be given to avoid any danger of secondary infection.

The treatment of urethritis in the female is similar to that in the male, except that with posterior irrigation a female catheter takes the place of a Wyndham-Powell nozzle. The anterior urethra should be well washed out with the catheter before the catheter is passed on to the bladder. For vaginitis, douchings of 1 in 4,000 permanganate are employed, which may be followed by tamponage with iodoform gauze.

Cervicitis should be treated by swabbing the cervical canal with pledgets of cotton-wool soaked in a solution of sodium bicarbonate. In this way the tenacious mucus is removed, so that the bactericidal drug can be brought into direct contact with the infected surface. Occasionally curettage of the canal is advantageous. The cervical canal is now swabbed with liniment of iodine or a strong solution of silver nitrate.

Gonorrhoeal inflammation of Bartholin's glands is treated by incision or excision of the gland. Total excision is usually recommended, and care must be taken, when possible, to remove the gland intact. If the duct only is infected, incision is sufficient.

REFERENCES.

¹ *Traité de la Blennorrhagie*, by Georges Luys, translated by A. Foerster. ² *A Manual of Venereal Diseases*, second edition, by Officers of R.A.M.C.

A CASE OF OTITIC MENINGITIS AND CEREBELLAR ABSCESS, WITH RECOVERY.

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RECOVERY in cases of otitic meningitis is sufficiently rare to merit publication when it occurs. The case recorded below illustrates the possibility of recovery when all the classical signs of the disease have become established, and are even further complicated by the presence of a cerebellar abscess.

History.

A. D., a girl of 17, was seen by one of us in consultation on the evening of August 13th. A week previously she had complained of severe occipital headache which had gradually become worse, until within the previous forty-eight hours delirium, high fever, and other signs of meningitis had supervened. There was an offensive discharge from the right ear, but the mother of the patient was emphatic that the discharge had commenced since the illness began. Subsequent inquiries from the patient have failed to elicit a history extending more than a week previous to the commencement of the illness. On examination the patient presented a typical picture of acute meningitis. She was semiconscious, but could be roused, when she immediately complained of pain in the head and back. There had been vomiting throughout the day. The pulse was 108, temperature 103° F., marked head retraction, definite Kernig's sign, and general hyperaesthesia. There was no ocular palsy and no nystagmus, but the optic discs were very red and the veins were distended. An attempt at lumbar puncture had failed, owing to the rigidity and restlessness. She was at once sent to the Royal Infirmary, where a second attempt at lumbar puncture was also unsuccessful. The next day the ears were carefully examined, and she was submitted to operation. It had been thought that the otitis might have been secondary to cerebro-spinal meningitis, but the examination showed that there must undoubtedly have been some old trouble in the middle ear.

Operation.

On August 14th, under a general anaesthetic, a lumbar puncture was performed, and a few drops of turbid cerebro-spinal fluid were obtained with difficulty. A radical mastoid operation was then performed. Pus was present in the antrum, and this was traced back into the posterior fossa, where a large extradural collection of pus was evacuated. The dura in this region was

softened and disintegrated. The bone was widely removed over the posterior fossa, and internally along the posterior surface of the petrous nearly to the internal auditory meatus.

After-Course.

On the following day the right external rectus was seen to be paralysed. The patient progressed favourably for some time, the meningeal symptoms gradually subsiding, although the temperature remained raised and variable until August 23rd, when it fell to normal. This continued for five days, when she began to complain again of the headache, and on August 29th the temperature rose to 100°, and she vomited twice. The pulse-rate became subnormal, varying between 55 and 70, with occasional rises to 90. The temperature varied between 98° and 100° until September 8th, when it registered 97°. The vomiting continued.

The large bony wound became gradually filled up by a hernia of the cerebellum. Mr. G. H. Pooley kindly examined the fundi, and reported, "No optic neuritis; edges of discs a little blurred," on September 1st. The absence of optic neuritis at this time is probably accounted for by the free decompression.

On September 5th a probe introduced into the hernia allowed a scanty quantity of serous fluid to escape. On September 8th a pus-seeker was introduced into the hernia and an abscess containing about 1½ oz. of thick greenish pus evacuated. A soft rubber drain tube was left *in situ*. The pulse at once improved, and the patient expressed herself as much better and the vomiting abated; after three days, however, it recurred. The pulse remained about 110 and the temperature about normal. The vomiting continued at intervals until the beginning of October, when the tube was removed.

The persistence of the vomiting after the evacuation of the abscess caused considerable difficulty in diagnosis at the time, and was probably due to the presence of the drainage tube. This might have been removed at an earlier date, as the discharge through the tube practically ceased after a few days. It was thought desirable, however, to preserve the track in case future exploration might be necessary. There was such a complete absence of mental disturbance that, in spite of the persistence of the vomiting and of the dysidiadokokinesis, it seemed hardly probable that there was any further intracranial mischief. There was a marked acetone odour in the breath, and this raised the question of "toxic" vomiting. Accordingly, a twenty-four hours specimen of urine was submitted for examination in the clinical laboratory. The result was as follows:

Quantity 312 c.cm. Total nitrogen 3.92 grams, ammonia nitrogen 0.308 gram (ammonia coefficient, therefore, 9.42 per cent.). No albumin, no sugar, slight diacetic acid reaction, but a very strong acetone reaction.

The low total nitrogen illustrates the severity of the vomiting, and renders the coefficient of 9.42 per cent. of no value as an index of toxic acidosis. The hernia quickly subsided, and gradually the wound healed. The paralysis of the right sixth nerve completely disappeared after about a month, and the patient left the infirmary on December 10th.

REMARKS.

Lumbar Puncture.—When, under an anaesthetic, the spinal thecae were at last tapped it was found that there was no evidence of increased pressure, and only a very small quantity of fluid could be obtained. This is sometimes the case in meningitis, and is usually ascribed to the presence of adhesions which prevent the free circulation of the fluid. In our case it may have been due to pressure exerted by the cerebellum in the neighbourhood of the foramen of Magendie. The fluid obtained was sent to the clinical laboratory, and the clinical pathologist (Mr. W. W. King) reported as follows: No reduction of Fehling's fluid, numerous polymorphonuclear leucocytes, endothelial cells and lymphocytes, large number of Gram-positive diplococci, which are found mainly inside the polymorphonuclears, cultures sterile in eighteen hours. A piece of bone removed from the mastoid was submitted to bacteriological examination, and revealed the presence of a mixed infection with staphylococci, streptococci, Gram-positive diplococci, and a Gram-negative motile bacillus rather similar to the *B. pyocyaneus*, but not producing any of the characteristic pigment on subculture.

Diagnosis.—Is there sufficient warrant in these findings for the diagnosis of meningitis as appended to the report