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# SUPPURATIVE EXFOLIATIVE CYSTITIS

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H. J. BOLDT, M.D.,

NEW YORK.

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[Reprinted from the AMERICAN JOURNAL OF OBSTETRICS AND DISEASES  
OF WOMEN AND CHILDREN, Vol. XXI., April, 1888.]

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## SUPPURATIVE EXFOLIATIVE CYSTITIS.

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THIS form of cystitis is usually overlooked, or but briefly referred to, by authors, and when described is generally erroneously called diphtheritic, croupous, or plastic cystitis, etc. That there is a diphtheria of the bladder I do not question, neither do I deny that it is of most frequent occurrence in the female during the pregnant or puerperal state.<sup>1</sup> The same may be said of plastic or croupous cystitis.<sup>2</sup> We must, however, draw a line of distinction between such diseases and that which I will consider in this article. We have no *false* membrane to deal with, it is not a *formed* membrane, but it is a true constituent portion of the bladder which by disease has been dissected off, and then is either expelled or remains loose in the viscus. If the mucous membrane alone be detached by the inflammatory process, it does not macroscopically differ from those layers of fibrinous exudation which are pseudo-membranes, but in no respect true bladder structure. Hence, perhaps, the confusion of some observers.

This variety, or rather degree of cystitis, occurs most frequently in the female in the pregnant or puerperal state. I should prefer to give to it the name *Cystitis suppurativa exfoliata*, in contradistinction to the suppurative inflammation of the bladder occurring during severe febrile and infectious diseases, because in the latter only small shreds of tissue become detached at one time. The same holds good for the necrotic cystitis of paralytics.

Before going into a description of the disease I will review the valuable parts of some of the published cases. After a careful search through the literature I have been able to collect

<sup>1</sup> Garrigues, Transactions of the American Gynecological Society Vol. x., 1885.

<sup>2</sup> See Winckel's and other treatises on diseases of women and child-bed.

twenty-nine cases, but want of space in this article forbids the recital of all, neither will it add anything in the main because the histories are very similar. Some cases lack careful investigation of the exfoliated structure, so but little need be said of them.

*Tulpius* ("Observationes Medicæ," Lugduni Batavorum, 1716) cites the first case. A woman who supposed herself to be suffering from stone in the bladder passed a moderately large membrane during micturition, which was covered with minute stony deposits. More shreds of membrane were passed subsequently. After a lingering illness, complicated with incontinence of urine, the patient finally recovered on tonic treatment.

*Zeitfuchs* (Siebold's *Journal für Geburtshülfe*, 1833) describes a case in connection with retroversio uteri gravidi. Recovery. Pregnancy went to end of term, with twins.

*Dr. M. Wittich*, Eisenach (*Neue Zeitschrift für Geburtshilfeskunde*, 1847, Vol. XXIII., p. 98 to 117). Pt. æt. 28, became pregnant in the latter part of May, 1844, the third time, proceeding normally in gestation to August, when, upon lifting a heavy burden, she experienced sudden pain in the pelvis, accompanied with a feeling as if something was tearing in the abdomen. She was compelled to go to bed. There was disturbance of the urinary functions; pain in the hypogastrium; urine could be voided only in decubitus and in drops. Constipation. Several days later the urine looked "dark red."

Dr. Theyson saw the patient in consultation on August 26th, and on examination found the abdomen distended by an over-filled bladder. The urine voided had a foul, sharp odor, such as is produced by macerated animal substance. More careful examination showed the patient to be suffering from a retroverted gravid uterus. After many fruitless attempts, reduction of the displacement was accomplished on September 6th. In the interval the urine continued to be offensive, and contained shreds of the bladder mucosa. A piece of membrane presenting at the urethral orifice was withdrawn; it had a foul odor, was gray, and distinctly included a portion of the muscular structure. The patient eventually recovered, some weakness of the bladder remaining.

*Prof. Luschka*, Tübingen (*Arch. f. pathologische Anatomie*, 1854, Vol. VII., p. 30). Pt. æt. 26. Retroflexion with pregnancy advanced into the twentieth week. For the past three weeks she had suffered from retention of urine. With intense tenesmus and severe burning pain but few drops of urine could be passed at one time. On account of failure to empty the bladder per catheter, the viscus was punctured. The urine was afterwards continually withdrawn through a canula which had been introduced at the point of puncture. The patient, how-

ever, died on the twelfth day after the operation with typhoidal symptoms (septicemia?). The mucosa of the bladder was entirely detached from the muscularis and the urethral opening nearly wholly closed by an exudation. The walls of the bladder were very much thickened; the thickening being not only dependent on the hypertrophy of the muscular structure, but also on a considerable increase and condensation of the surrounding free and submucous cellular tissue. The loose sac had a dirty-gray color, and showed no signs of epithelial covering.

*Mr. Maunder* (Trans. London Path. Soc., Vol. XIII., 1862). Pt. æt. 29 years; three months pregnant. Retention of urine. A catheter had slipped into the bladder. Urethra was dilated and the foreign body removed, when a large quantity of bloody urine was poured out. Under the care of Dr. Barnes symptoms of acute cystitis prevailed many days; at length the membrane said to have come from the bladder was shown. Recovery. Bladder trouble remained. It was doubted at first that Dr. Maunder's view, that the membrane was a portion of the bladder, was correct. Committee report, however, confirms it. (*Med. Times and Gazette*, 1863, Vol. II., p. 522 and 678.)

*Hausmann* (*Monatschrift f. Geburtsheilkunde*, 1868, Vol. 31, p. 132). Diphtheria of the bladder with subsequent exfoliation of a portion of the mucosa. VIIpara. Fourth month of gestation. Uterus was retroverted, and retention of urine had been present since the end of the third month of pregnancy. On October 3d, 1867, pt. was admitted into the obstetrical clinic where the uterus was reduced. Examination of the urine showed it to be muddy, yellowish-gray, alkaline, ammoniacal; sp. gr. 1.006. The microscope showed large quantities of brownish, discolored pavement epithelium from the mucous membrane of the bladder; cells in the process of destruction; detritus and vibriones. The specimen was shown to the Obstetrical Society of Berlin on November 26th, 1867; it measured in length 5½ cm. and 5 cm. in width; it had a number of openings about the size of a pea which were principally artificial products, but probably one of them was the opening of the ureter into the bladder (*which I think doubtful*). The date of the exfoliation is not stated. Microscopical examination of the specimen shows it to be true mucous membrane. *Not a false membrane, which it would be, were it diphtheritic.*<sup>1</sup> Although Hausmann stated that it was an exfoliation of the mucosa of the bladder due to diphtheria, there is nothing in his lucid description of the case which would permit such conclusion. The retention of urine, which caused the cystitis, was due to pressure of the cervix against the symphysis, compromising the bladder; posterior was the gravid uterus which caused the persistence of the pressure. The bladder was felt as an elastic swelling above the os pubis. Recovery.

<sup>1</sup> Italics are mine.

*Fr. Schatz*, Leipzig (*Archiv für Gyn.*, Vol. I., p. 469). Pt. 35 years old; IVpara. Previous confinements moderately tedious, also suffered from prolapsus uteri. In October, 1869, while carrying a heavy washtub, she was suddenly attacked with pain in her abdomen, followed by bladder trouble, which was not present formerly; for a full week complete retention of urine existed, after which followed a continuous dribbling of urine. Constipation. She was seen by Schatz on November 26th in a condition of extreme exhaustion, elevation of temperature, and a rapid pulse. Examination revealed a gravid incarcerated retroflexed uterus. The urine was putrid, containing mucus and pus. The patient died after several days, premature delivery having taken place seven hours before death. In this case the autopsy showed the entire mucous membrane of the bladder, with the greater portion of the muscular structure, to be detached and lying loose in the viscus. The inner part of the membrane consisted of uric acid crystals, elastic fibres, fibrin and mass of detritus. Of the normal structure of the mucous membrane and epithelium very little could be seen.

*W. Moldenhauer* (*Archiv f. Gyn.*, Vol. VI., p. 108) reports a case similar to Schatz's. Retroflexed gravid uterus as the cause of the cystitis. Fatal termination.

*S. Brandeis* (*Arch. f. Gynaekologie*, Vol. VII., p. 189). Retroflexed gravid uterus; portion of mucosa exfoliated. Recovery.

*Moritz v. Madurowicz*, Krakau (*Wiener med. Wochenschrift*, 1877, Nos. 51 and 52). Patient IIpara; pregnant in fourth month, with a retroverted uterus and retention of urine, which passed in drops with much pain; fever; pain in the back and lower part of abdomen; constipation. The uterus was replaced and patient felt better; the urine, however, became more turbid, thicker and foul, containing more and more connective tissue. There was no control of the bladder, there being a constant dribbling, and evidence of larger quantities when the catheter was used. On the twenty-seventh day of illness, when the introduction of the catheter was tried, a membrane of offensive odor was found to obstruct the urethra. The catheter was introduced alongside of the membrane and a quantity of putrid urine was discharged. On the following day the membrane was discharged spontaneously. It was necrotic, of about the thickness of the forefinger, 2 cm. in length, and included the entire thickness of the bladder wall with a portion of the peritoneal covering. Patient recovered.

*Dr. Martyn* (*Trans. of London Path. Soc.*, Vol. XV., November 17th, 1863) reports a case of a IVpara, confined April 18th, 1863. Bladder trouble began four days after delivery, ceasing in two weeks. One month later, vesical symptoms again developed, and the membrane was expelled in two pieces; the patient recovered, so that at the end of ten months she was able to walk, but the bladder remained weak. Symptoms were

pinched and anxious features, patient lying on her back with raised knees. Very quick pulse. Belly distended and tender on pressure. Intravaginal swelling. Constant dribbling of urine, which was highly offensive and ammoniacal, gradually becoming more and more putrid, with copious deposits. Symptoms of obstruction of the urethra were present. On the slough was a great deal of grit consisting of phosphates.

*Spencer Wells* also reports cases in the Transactions of the London Pathological Society. One, a primipara, æt. 22, confined August 20th, 1862. Death occurred October 16th, 1862. The sac, on autopsy, lay loose in the bladder. Another case was also a primipara. Forceps delivery in October, 1862. On December 3d, membrane was noticed to come away in shreds. The urine was not examined until three weeks after delivery, when it contained blood, pus, albumin, renal tube casts, and chylous matter. Reaction alkaline.

*M. J. B. Hurry* (*Edinburgh Med. Journal*, May, 1884) and *Krukenberg* (*Arch. f. Gyn.*, 1882) each report a case.

*Dr. J. H. Aveling*, in the meeting on March 3d, 1883, of the London Obstetrical Society, showed a cast of the female bladder. Primipara, forceps delivery. Urine was not passed properly for three days, it dribbling away during this time; abdomen enlarged. On the fifth day, a catheter was used and a quantity of dark, thick, and offensive urine withdrawn. Three weeks afterwards, something caused obstruction to the flow of urine through the catheter, upon which the urethra was dilated, when a rush of urine followed, and a white membrane appeared at the orifice of the urethra. This was extracted and proved to be a portion of the exfoliated mucous membrane of the bladder. No muscular tissue was present upon it. The patient recovered, but incontinence of urine remained.

*Dr. Graily Hewitt* also showed a similar specimen before the London Obstetrical Society, the disease resulting from prolonged retention of urine after delivery.

*Frankenhäuser* (*Arch. f. Gyn.*, '77, and Franz Ribincknar, thèse citée, p. 25). Patient æt. 39 years., VIIpara; was admitted in the clinic November 29th, 1875. On the night of November 18th, patient got out of bed to perform some duty for her youngest child. Suddenly she noticed an intense desire to urinate, which inclination she could not satisfy; up to that time no abnormal function of the bladder had ever been noticed. The desire to micturate became more urgent from hour to hour. On the following day a physician was sent for, who treated the patient with two catheterizations daily. Twice subsequently the patient could pass urine voluntarily after a hot bath. On November 23d, uterine contractions set in, which were supposed to premise an abortion, and an unsuccessful attempt was made to extract the fetus. A tumor in the posterior wall of the uterus was then thought of by the attendant. Finally, when the patient began to get exhausted, she was sent to the hospital. In-

continence of urine had existed the entire time. The urine had a putrid odor. There had been loss of sleep and appetite since the beginning of the illness with severe pains about the region of the bladder and introitus vaginæ; no vomiting. Bowels moved only after administration of a cathartic dose of castor oil. On admission, general condition bad. Temp. 101.1° F. Pulse 126. Patient anemic. The bladder presented a tumor in the median line reaching to the umbilicus; several glasses of brownish urine, which was cloudy and mixed with pus and blood, were at once withdrawn with a silver catheter. In consequence of the continuous dribbling of urine, the vulva was very much inflamed and appeared covered with a diphtheritic exudation. On examination, a retroflexed gravid uterus of about the fourth month was discovered. Reduction was easily accomplished in the kneechest position, and the bladder irrigated. December 6th, patient looks and feels better; the appetite is gradually returning. The urine continues to dribble; catheterization must be continued. The vesical region is somewhat tender to touch; the odor of the urine is not so offensive; it does not contain quite as much blood, but considerable pus. Notwithstanding abdominal and lateral position, the uterus fell backwards again, and replacement was very painful. Slight amount of fever present. Pulse 108-120. On the 13th, the condition was better; temp. normal; in the evening 100.4°. Pulse 100. The patient now aborted. Hemorrhage was very profuse and the placenta had to be scraped away manually.

December 20th. No fever; good appetite, and can sleep better. After the abortion, the urethra was dilated to such an extent that the irrigating fluid, in washing out the bladder, returned alongside of the largest size canula; only in the genu-pectoral position was it possible to keep a small quantity of fluid in the bladder.

Dec. 27th and the previous days, small pieces of the necrotic mucosa were expelled spontaneously or extracted through the urethra. Pain very intense. On the morning of this date, a necrotic mass, as thick as the thumb, showed itself at the urethral orifice. It was extracted in the evening with very little bleeding by Prof. Frankenhäuser. The extracted piece included the greater part of the bladder wall with a fragment of the peritoneum. On January 3d, immediately after extraction of a gangrenous portion of the bladder, patient had a chill, with temperature of 102.2° F., pulse 126, and vomiting. The following day temperature normal, pulse 100. Urine passes constantly; the insufficiency of the sphincters is such that not a drop will remain in the bladder, which is washed out four times daily. On the 25th of January, erysipelas appeared about the genitals and back, with a temperature of 103.6°, pulse 126. This subsided and the patient gradually improved. On Feb. 19th, the capacity of the bladder was found to be 50 c.c.; uterus retroflexed. By treatment (dilatation), the bladder capacity was increased to 150 c.c. A Hodge

pessary was introduced. On April 2d, the patient left the hospital, and was treated subsequently in the out-door department.

*Pinard and Varnier* ("Annales de Gynécologie et d'Obstétrique," November, 1886, pp. 346-354). Patient, æt. 21 years, came under observation on April 23d, 1885. One year previous she had a child, the delivery being terminated with forceps on account of weak labor pains; this was followed by profuse hemorrhage, and the patient was compelled, by extreme weakness, to remain in bed for one month. After this, good health returned.

In December, 1884, patient ceased to menstruate, but felt perfectly well up to about April 8th, when, after a long walk, she noticed pain in her abdomen, as though a weight was coming out of her bowels. From this moment the bladder functions were compromised, especially at night; frequently she had to strain ten to fifteen minutes to pass a little urine, which, she said, was quite normal. The straining was not painful. Eight days later, on the 16th of April, she was suddenly attacked with complete retention, which lasted the whole day. A physician, sent for in the evening, withdrew without antiseptic precautions a large quantity of urine. On the following day catheterization had to be done again. On the advice of a midwife, who feared an abortion, the urine was no longer taken. Now violent abdominal pains set in, and urine was not passed except under the influence of abdominal pressure, retching, and vomiting.

In consideration of the symptoms, after diagnosing a retroversion of the gravid uterus, the physician attempted reduction of the displacement, but failed. On the 23d, she was admitted into the hospital in Prof. Bouchard's service, where two litres of foul, albuminous urine, mixed with small shreds, were withdrawn with the catheter.

The abdomen was distended, but not very tender to touch. Temperature, 104° F. in the evening. On the following day, temperature 102.2° F.; evening, again 104° F. Frequent irrigations of a three-per-cent boracic acid solution. Temperature from the third day normal, but on the evening of the fifth day again 102.2° F.

On the 28th of April, *i. e.*, five days after admission, she was transferred to the service of Pinard. Patient was pale, and had a marked loss of flesh. Pulse 90, temp. 102.2° F. Abdomen unequally distended. In the median line an elastic fluctuating tumor (bladder), extending two fingers' breadth above the navel, was felt. The catheter removed 300 gm. of thick, foul, sanguineous urine. On examination with the bladder empty, a mushy body, with round convexity, was felt behind the bladder, pressed against the rectum. The parametria were free. Palpation about the hypogastrium was painful.

Tarnier saw the patient on the following day, and corroborated the diagnosis of retroversion of the gravid uterus.

Attention was directed only to the purulent cystitis. The

urine was taken every three hours, followed by sublimate irrigation 1 : 2,000.

On May 6th, pain much severer; abdomen distended.

On the 7th, condition slightly better; later, sudden collapse; pulse 130; respiration 40; uncontrollable vomiting; universal erythema, most marked in face and on chest; septicemia; 260 gms. of urine per catheter. Death occurred at noon the following day.

Examination by Clado, reported by authors (*Ibid.*, February, 1887).

"In the case observed by us, we had a detachment of the bladder mucosa, much inflamed, changed, and with a portion of the muscularis attached. The structure of the mucosa is composed of a number of elements (embryonic) held together by connections of diminutive size and small in number. Beneath these we find numerous blood-vessels, which present occasionally, on cutting, a cavernous picture; these vessels are filled with blood-corpuscles, and are evidence of a previous injury. Deeper, we find muscle fibres. There are no epithelial cells present on the surface which can remind us of the bladder epithelium. This was probably destroyed by the intensity of the inflammation during the life of the patient."

A second fragment, which was taken out of the bladder post mortem, showed the mucosa to be in the same condition as the first. Here and there the muscularis is naked, where the mucosa has been detached. No evidence of an epithelial stratum.

*H. J. Boldt* (*Trans. N. Y. Path. Soc., N. Y. Med. Rec.*, October 31st, 1885). Patient  $\text{\textcircled{a}}$ t. 18 years and 8 months, primipara, confined Sept. 18th, 1885, of a healthy, medium-size male child, in L. O. A. position. Previous history good. Pregnancy and labor normal. On Sept. 21st, the patient began to complain of colicky pains in the hypogastrium and pains in the lumbar region; both were tender on pressure, but nothing further unusual was noticed on examination. Micturition gave no pain, and seemed to be at normal intervals for that period after delivery, four to five times in twenty-four hours. The bladder, however, was evacuated by catheter at that time, with antiseptic precautions, and about four ounces of urine were withdrawn. This had a slightly acid reaction. Specific gravity 1.022; contained albumin, blood, small quantity of pus, renal tube epithelium, bladder epithelium, and phosphates. Diagnosis: Acute catarrhal nephritis with hemorrhage. The axillary temperature varied from 101° F. to 102.6° F.

On September 26th, the patient began to complain of tenesmus and dysuria. The straining was severe and continuous. The catheter was again used, when eight ounces of thick, bloody, muddy-looking urine, having a putrid ammoniacal odor, was withdrawn. It was of alkaline reaction; sp. gr. 1.005; contained albumin, blood and pus in large quantities, shreds of connective tissue, renal tube epithelium, bladder epithelium—all

three layers—the caudate-shaped epithelium of the deepest layer predominating. The bladder from this time on was regularly washed out with carbolated water 1:150 on account of the existing cystitis. The temperature was 99° F., and did not vary more than one degree either way until October 2d. On the morning of this date, information was given that the patient had spent a very restless night and had more pain in the hypogastrium than previously, and that she thought something prevented her from micturating; it felt like a small lump near the urethral orifice. The temperature was 101.4° F. On inspection, a small sac, about the size of a bean, was seen protruding from the urethral orifice. A bimanual examination, which was rather unsatisfactory on account of extreme tenderness over the bladder and intra vaginam, revealed an edematous and very painful swelling on the anterior vaginal wall, just above the symphysis pubis. The position of the uterus, on account of existing tenderness, could not be made out. Turning again to the small mass, which was taken to be either a part of the urethra inverted or the inverted bladder, it was found that it could be easily reduced, and then the bladder was washed as previously. Several hours later, the sac was found protruding again, and then about the size of a small walnut, emitting an extremely fetid odor. I now felt almost certain that I had an inverted sloughing bladder to deal with. Reduction of the sac was necessary before washing of the bladder could be accomplished. The temperature was then 103.2° F., but went down to 101.6° F. about an hour after the viscus was cleansed. Early in the afternoon the sac-like mass was protruded again; much pain, tenesmus, etc., being present; temperature, 103.8°. The bladder was now washed out almost continuously until the temperature went down to 101.8° F. Drs. W. T. Lusk and Van Wyck, who saw patient in consultation, agreed in diagnosis and treatment.

Lusk thought, after examination of the patient, that the intravaginal swelling felt and, apparently fluctuating, might be an abscess between the walls of the bladder, but the use of an aspirator disproved this. On the following morning, soon after washing out the bladder, a large membrane, which I termed a "cast of the bladder," was discharged, the thick portion which first protruded was first expelled. Immediate relief was experienced by the patient. (The "cast" seemed to be the greater portion of the lining membrane of the bladder.) The washings at first always contained blood, pus, shreds of connective tissue and muscular structure. The temp. previous to each washing being 101.2°–101.8° F., always fell from 1–1.2°. Incontinence of urine was persistent to the end. The microscopical appearances of the urine remained as formerly, only more *muscular* structure could be seen by the naked eye, and verified by the microscope. Throughout the course of the case the urine always contained large quantities of phosphates.

From October 5th, something seemed to obstruct the intro-

duction of the catheter at a point, by measurement,  $2\frac{1}{2}$  inches from the orifice of the urethra; pain was produced by the introduction beyond  $2\frac{1}{4}$  inches. Patient felt again as though a lump was lying in the urethra.

October 9th. Patient had spent a restless night, nothing otherwise unusual was noticed; temp.,  $101.4^{\circ}$  F. At 5 p.m., very restless; pulse 140, temp.  $103.4^{\circ}$ . 8 p.m., temp.  $104.8^{\circ}$  F., pulse 150 and feeble. I thought exfoliated muscular structure might be in the bladder, giving rise to the obstruction to the introduction of the catheter. An examination with the finger per urethra disproved this. The remainder of the walls of the bladder were very much thickened, infiltrated and edematous, and the cavity much diminished. With the exploring finger all sides of the bladder were readily felt, and all parts seemed denuded of the mucosa, except just around the internal urethral orifice. A few rough spots on the sides and at the fundus were also felt; probably from these the muscular tissue came, shreds of which were continuously found in the urine, upon the napkins, and in the washings. About an hour later, patient began to develop cerebral symptoms.

At 1.30 a.m. of October 10th, the temp. was  $106.4^{\circ}$ ; pulse imperceptible, despite of antipyretics and stimulants used in large doses per rectum, as nothing would remain on the stomach. Cerebral symptoms very marked. At 1 p.m., October 10th, death took place.

Vomiting, constipation, and hiccough were prominent symptoms throughout the disease; the vomiting and hiccough almost uncontrollable the last few days.

Report by Dr. Waldstein of the Com. on Microscopy (Ibid., October 31st, 1885.) "Transverse sections show that the specimen is composed of fibrous tissue in process of granular disintegration, between the fibres of which are found a series of large distended, generally rounded spaces, either entirely empty or partly filled by a finely granular mass and a delicate network of fibrin; a state of edematous imbibition of the submucous tissue. Muscular elements are comparatively rare throughout, those demonstrable have undergone either a granular or more hyaline degeneration, the nuclei being faintly and diffusely stained by the reagent. The blood-vessels are in many places densely filled with blood-corpuscles, and surrounded by small hemorrhagic foci; most generally, however, they are found empty and their walls degenerated, while the nuclei have disappeared. Epithelial covering or glandular structure the committee have not been able to make out. The thickness of the specimen can be accounted for by the edema of the tissue."

*Etiology.*—The most frequent cause of this disease is posterior displacement of the gravid uterus, in which condition the most dangerous symptoms arise from the bladder. In a very

able article by Pinard and Varnier,<sup>1</sup> they state that in the consideration of the symptoms and pathology of retroversio uteri gravidi, the uterus is nil, but the bladder, on the contrary, is everything. Although this seems to me to be carried a little too far, yet in the main I agree with it.

Another frequent cause is undue or too long continued pressure of the presenting part of the child on the bladder during labor, especially when the viscus is full. Next comes the improper use of instruments, and neglect to inquire after delivery as to the functions of the organ, together with the delayed use of the catheter, if the information is at all doubtful. A cause, which is considered to have given rise to the disease in my case, by Dr. C. Heitzmann from examination of the urine made by him at different times, is the extension of the inflammatory process from the kidneys downwards to the ureters, thence to the bladder. Personally I cannot yet share this view. If we have an inflammatory process extending from the kidneys down towards the bladder, the disease would not be so destructive to the tissues composing it, and as yet there is no other case on record where such could be considered as the causative moment.

The cause of the exfoliation *en masse* may be looked for in the long-continued physical distention of the bladder, in connection with the caustic action of the ammoniacal urine.

There are frequently present smaller or larger involuntary evacuations of urine, or there may be persisting incontinence from overflow, so that the urine dribbles drop by drop continuously. Decomposition of the urine then takes place, it loses its acidity, becomes alkaline and putrescent, and cystitis, more or less rapidly developed, is the consequence. Such occasional evacuations, or incontinence, or both may mislead the physician, he may be taken off his guard and when too late he discovers his unintentional neglect; but even if he does catheterize when first called, if this occurs when the condition has existed some time, it may be too late to allay the mischief; and the treatment, the introduction of the catheter, admitting air into the bladder, then hastens the decomposition process; or again, although the catheter be introduced, the expected escape of urine does not

<sup>1</sup> Contribution à l'étude de la rétroversion de l'utérus gravidé. Annales de Gynécologie et d'Obstétr. Fév. et Mai 1887.

follow. Why? Localized necrosis has already begun and shreds of membrane are low down in the bladder, which at once clog up the eye of the catheter and only a few drops or none at all will flow, or again, the dissecting process may already be entirely completed, the entire mucosa lie loose in the bladder, and the natural urethral opening in the mucosa have become closed by agglutination or edematous infiltration, then the urine will be inclosed in this sac and none will follow the use of the catheter. Such conditions as the latter can, however, only take place in very rapidly progressing cases, where no urine has had an opportunity to escape between the walls of the mucosa, connective tissue, and muscular structure by way of previous small denudations caused by the gangrenous process.

*Pathology.*—The first changes observed in the bladder are those of an ordinary cystitis, as is shown by the condition of the urine. There is alkalinity, increase of phosphates; pavement epithelium of the first and second layer of the bladder, and pus. A little more advanced stage shows the caudate epithelium of the deepest layer, blood, connective tissue, and, according to the intensity of the disease, also muscular structure. If the kidneys are involved, as is usually the case, to a greater or less degree, in severe or in long (*i. e.*, more than two weeks') standing cases, there will also be renal epithelium, epithelium from the pelvis of the kidney, perhaps also renal casts in the urine.

The walls of the bladder are much thickened by inflammatory and serous exudation (edema), and if there is paralysis of the urethral sphincters, and no obstacle present to the egress of urine, so that none remains in the bladder at any time, as in Frankenhäuser's, mine and other cases, the cavity of the bladder will be much diminished from the hypertrophy of the muscular structure of the walls, edema, etc. To what extent this may be, can be seen by from Frankenhäuser's and my case.

Suppurative exfoliative cystitis may be divided into three degrees:

When the mucosa and connective tissue are involved, it is of the first degree.

The second degree: When the muscular structure is also implicated in the exfoliation.

Third degree: When the destruction has gone so far as to cause a portion of the serosa to be exfoliated.

When the separation commences, it is apt to begin at a point where the external pressure, which is opposed to the dilatation of the bladder, is least manifested—this is at the fundus opposite the neck of the bladder (Schatz); there also the consequences of unequal elasticity first show themselves if existing among the membranes composing the walls of the bladder. While the peritoneal covering and the external muscular coat are quite distensible, the internal muscular layer and the mucosa reach their border of elasticity much sooner. Separation then begins between these structures and the intervening space is filled with blood and serum; if localized necrosis has taken place previously, which usually is the case, decomposing urine and pus are also added to the dissecting agents. The dissection then proceeds downwards towards the neck of the bladder. It is this mode of separation which causes the sac-like mass when the mucosa is exfoliated in toto, or nearly in toto, to appear at the urethral orifice, and not the margins of the mucosa. In other words, the mucosa, with or without muscularis, is pushed down by the process of dissection from above, so that the fundal portion of the mucosa first presents itself exteriorly.

If bladder washings have not taken place during the treatment, the mucosa will be found covered, more or less, with crystals of the urinary salts; if, however, cleansing of the bladder has been practised from or soon after the beginning of the disease, the exfoliated portion will contain few or no such crystals.

On microscopical examination—transverse section—the portion cast off from the bladder consists of fibrous tissue in the process of granular disintegration. Between the fibres of connective tissue will be found numerous small spaces which present a cavernous appearance. These spaces may be empty or filled with blood; some may be partly filled by a fine granular mass and a delicate network of fibrin. If the exfoliation be of the second degree, muscular elements are also seen; these may appear normal or swollen, and they may also be in a process of granular or hyaline degeneration. The blood-vessels will usually be filled with blood. Normal bladder epithelium is invariably absent, having been destroyed by the intensity of the

inflammation. The destructive process may be so severe that the peritoneum becomes entirely destroyed, or very nearly so, when the slightest movement can produce rupture of the bladder.

The kidneys are congested, and show parenchymatous changes, if the disease has existed for some length of time, or symptoms of septicemia have been present. The pelves of the kidneys are moderately dilated, not so the ureters.

Evidence of pelvic peritonitis is present in all severe cases; this may extend and become general. There is also more or less urethritis from local irritation. Vaginitis is to be looked for. Parametritis may be so severe that formation of pus may take place.

*Symptoms.*—If occurring during pregnancy, there will be a history of retention of the urine. Usually the bladder trouble has existed a number of days, when the physician is consulted. The patient has the desire to micturate, but is unable to do so. As already stated in the etiology, there may also be constant dribbling or occasionally a larger quantity of urine passed.

The suppression of urine may be quite sudden. A woman pregnant can have her uterus displaced suddenly by a fall, as I have personally observed several times. In such cases, my experience has been that the attention of the physician, if consulted early, is not directed (by the patient) to the bladder symptoms so much as to those arising from the displaced uterus. If bladder symptoms are present, and the catheter is used, the obstacles which may be encountered, and the confusion they may lead to, as noted previously in the etiology, must be borne in mind. The consideration of the usual symptoms of a retroflexed or retroverted gravid uterus, such as severe dragging pains, constipation, etc., etc., not being within the scope of this paper, I shall omit, as also the condition of the intra-pelvic organs, as revealed by examination.

Now, taking it for granted that the malposition of the uterus has been rectified, and that this form of cystitis exists, there are apt to be present chilly sensations, perhaps rigors and sweating, pain in the hypogastrium, which is increased by pressure; this may become excruciating, and extend over a large area, even the whole abdomen. The abdomen feels distended to the patient, even though the bladder be empty. If this viscus has not been emptied artificially, palpation and percussion will

show it as a tumor (in the median line) rising above the brim of the pelvis, perhaps as high as or above the umbilicus. Vaginal examination is painful, and a swelling may be felt on the anterior vaginal wall at its junction with the vaginal portion of the cervix. This swelling feels edematous, and is exceedingly painful to touch. It may be mistaken for an abscess between the vagina and the wall of the bladder. The pulse is accelerated from 100 to 120. Vomiting, not preceded by nausea, as a rule, is frequent. Hiccough is occasionally present. The tongue is dry and parched, the thirst seems unquenchable, there is constipation. The temperature in the beginning is but slightly increased, perhaps not more than  $1^{\circ}$  to  $1.5^{\circ}$  F. later it may increase, and if a fatal issue is to take place, it may run up to or above  $106^{\circ}$  F., when cerebral symptoms will show themselves, and the patient present the picture of uremic or septic poisoning.

It may happen that after delivery the vesical disturbance will subside after having been present a few days, to begin again later, and the characteristic membrane may make its appearance soon. If the urine is examined in the interval, the changes indicative of an intense vesical catarrh will be found. When the membrane has become detached, and lodges before the urethra, even dribbling of urine will cease, and the effectual introduction of the catheter will be difficult. If the membrane is to be expelled voluntarily, it will work its way into the urethra by the continuous expulsive efforts of the patient (*which should, however, be overcome by treatment for the reasons to be given subsequently*), she desiring to micturate continuously, bringing all the auxiliary muscles for this act into action, the urethra will become gradually dilated, and, finally, the membrane appears at the urethral orifice in the shape of a small, dirty-gray pouch. The odor it exhales is putrescent, and at once reminds us of a slough.

*Differential Diagnosis.*—The history of the case must always be considered. It is impossible to make the diagnosis from the ordinary forms of cystitis until we meet with obstruction to the introduction of the catheter or the appearance of the membrane at the urethral orifice. The affection can only be confounded with inversion of the bladder when the sac-like mass appears at the urethral orifice. Over three-fourths of the cases of inversion occur in children, the protruding tumor in

that condition being *vascular*, elastic, and pear-shaped. Careful inspection will reveal the ureters, and, when closely observed, urine may be seen coming from them. The characteristics of the exfoliative tumor have been given. It may be stated here, however, that if the small pouch, seen first, be reduced again, on the next inspection the protruding mass is increased in size, more of the detached mucosa being protruded as the urethra becomes more and more dilated. Prolapse of the urethra would hardly cause confusion. The differentiation from *beginning* peritonitis would be made by the history of the case and the examination of the urine.

*Complications.*—Peritonitis, metritis, peri- and parametritis, septicemia, uremia. The latter is brought about by the extension of the inflammation upwards to the kidneys.

*Prognosis.*—This will depend on the intensity of the disease and the complications. It is bad if the destructive process has been very extensive. If the patient does recover, it is because the base of the bladder has not been denuded of its mucosa. If the mucosa remains unbroken around the urethral orifice in sufficient area to form a receptacle for the urine, it may regenerate again from this portion. It is thus that the recoveries, even from a severer degree of the disease (as Moritz Madurowicz's case, etc.) may be explained. The contractures formed by quite extensive destructions, even of the muscularis, can be overcome in the course of time, if the necrosis has taken place at the fundus or upper half of the bladder. Incontinence of urine, however, remains for a long time, and sometimes permanently. If rupture of the bladder takes place from an overdistention of the organ, after the necrotic process has extended to the peritoneal covering, or the gangrene even taken with it a portion of the serosa, death is the result, unless laparotomy, with other appropriate surgical treatment, be performed at once.

The patient may also die from uremia or septic poisoning. When either of such complications exist, the prognosis is bad. Cases with temperatures above 105° F. and cerebral disturbance invariably die, if the elevation of temperature is due to blood-poisoning, unless a favorable change takes place within four or six hours. Persistent hiccough is a bad omen.

*Treatment.*—A displaced uterus must at once be replaced to its normal position, after emptying the bladder of its contents

by catheterization. The physician must satisfy himself that the patient has control of the bladder, and he should also carefully watch the urine for a few days subsequently. The reduction of the displaced womb must be done without undue force, and with as little pain to the patient as possible. It is best accomplished in the genu-pectoral position, passing the index and middle fingers behind the uterus into the cul-de-sac of Douglas, or in the rectum (I have found either mode serviceable, according to the case). The uterus, with its contents, is then gently carried, or rather pushed, upwards, laterally and forwards, describing a semicircle towards that sacro-iliac synchondrosis to which it is inclined. Failure will not infrequently be met with if the pressure exerted is directly upwards and forwards. To illustrate the procedure with an example: I was called in consultation to see a IIIpara, who had retention of urine and an impacted retroflexed uterus, fourth month of pregnancy. The two physicians, who asked me in council, had made numerous attempts at reduction for the past two days without success. The patient was put in the position advocated above, one gentleman assisting her to keep in *proper* position, while the other passed the index and middle fingers of each hand into the vagina, retracting side and upwards so as not to be in my way in the median line, to give me the benefit of the air pressure. With my fingers in the rectum, using this lateral up- and forward rotation, no difficulty was experienced in reduction. As yet I have not had the misfortune to fail in reduction. Should this, however, happen, and it was a matter of importance to save the fetus, I would not hesitate, with the comparative safety with which abdominal surgery is practised now, to open the abdomen to find and remove the cause of the hindrance to reduction. After the uterus is put in position, a well fitting pessary should at once be introduced, and the patient kept on her side inclined toward her abdomen. Fear, on account of the abdominal wound, need not be entertained, if it has been *carefully* closed, the peritoneum separately, and the stitches in the abdominal wall in closer proximity than for abdominal wounds under other circumstances; a well-fitting roller bandage should be applied, which is not so apt to slip up, and can be applied with more exactness than the ordinary bandage which we are generally in the habit of using after abdominal sections.

Under ordinary circumstances, if reduction cannot be accomplished, we must produce an abortion as soon as possible; the uterus once empty, the difficulty is not so great. If this fail, however, much time (in view of the gravity of this form of cystitis) should not be lost, but laparotomy should be done, as in the hands of an experienced operator the danger is almost nil.

Although the consideration of rupture of the bladder as a consequence of retroflexion of the gravid uterus without previous suppurative exfoliative cystitis does not belong in this paper, I take the liberty of calling attention to this possibility. To my knowledge eight such cases are on record as having occurred from 1765 to the present time. In a ninth case by Schwarz,<sup>1</sup> the mucosa was detached almost everywhere, nearly to the neck of the bladder. Would timely laparotomy, with the other treatment recommended by me, not probably have averted this accident? I think so. All of the nine patients died.

The most scrupulous attention must be given to the bladder, for there lies the great danger which we must endeavor to avert, and treatment must be the same in cases occurring after confinement or in connection with the pregnant state. The bladder must be carefully watched in all cases after delivery, and on the slightest doubt the catheter must be used. Should signs of suppurative or severe catarrhal cystitis exist, it should be emptied at regular intervals, and afterwards washed out with some mild antiseptic solution, as carbolic acid, 1 : 200; bichloride of mercury, 1 : 20,000; boric acid, Thiersch's solution, etc. The urine should, from time to time, be examined microscopically. If the flow of urine becomes obstructed through the catheter, as is not infrequently the case in exfoliative cystitis, by detritus clogging the eye, it must be removed and cleansed. If obstruction to the introduction of the catheter is present, the urethra must at once be dilated, under chloroform if necessary, and the cavity of the bladder explored with the finger. Under all circumstances foreign bodies, for such the gangrenous portions of the bladder are, must be removed with forceps by *gentle* traction, and we must inform ourselves of the exact condition of the bladder.

<sup>1</sup> Centralblatt für Gynaekologie, 1880.

If the disease has affected the muscularis, or has already extended to or into the peritoneal covering, the contractions of the bladder must be overcome if incontinence of urine does not already exist, so that the bladder may, on account of the danger of rupture, which is increased according to the depth of the necrotic process, be kept constantly empty. This can be done by extensive dilatation of the urethra or the establishment of a vesico-vaginal fistula; this should be made large, so as to enable débris to pass through it.

Pinard and Varnier propose the lithotomy operation in cases where the membrane cannot readily be extracted per urethram. I cannot imagine any case where such a procedure would become necessary; if the urethra be sufficiently dilated, we can get into the cavity of the bladder with instruments to remove the foreign body; if it be a closed sac, it can be punctured, and after the decomposed urine has been emptied, it can be seized and removed.

Internal medication is useless. Support the patient's strength with proper nourishment and stimulants. To control the thirst, I would advise the *avoidance* of cracked ice, this rather increasing than diminishing it, but give a little *hot* water. The necessity of the most scrupulous asepsis and antisepsis is a prerequisite from the beginning to the end.









