

Staff Meeting Bulletin
Hospitals of the » » »
University of Minnesota

Inlying Catheter

STAFF MEETING BULLETIN
HOSPITALS OF THE . . .
UNIVERSITY OF MINNESOTA

Volume XII

Friday, December 13, 1940

Number 9

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Published for the General Staff Meeting each week
during the school year, October to May, inclusive.

Financed by the Citizens Aid Society.

William A. O'Brien, M.D.

I. LAST WEEK

Date: December 6, 1940

Place: Recreation Room
Powell Hall

Time: 12:15 - 1:00 p.m.

Program: Movie: "Profit Without Honor"

Encephalo-Myelo-Radiculitis
Charles G. Polan
A. B. Baker

Discussion
J. C. McKinley

Present: 158

Gertrude Gunn
Record Librarian

- - -

II. MOVIE

Title: "Bill Posters"

Released by: R-K-0

- - -

III. ANNOUNCEMENTS1. NEW ADDRESSES

Mancel T. Mitchell, M.D. is now with the Division of Maternal and Child Health, New Mexico Department of Public Health, 519 Palace Avenue, Santa Fe, New Mexico.

Maud M. Gerdes, M.D., is now full-time Director of Maternal and Child Health, Mississippi State Board of Health, Jackson, Mississippi. In her letter she lauds the chivalry of the South and tells of a recent accident she sustained in going over her district. She came out of it with a dislocated shoulder and 31 black and blue marks. Azalea time will soon be upon them, she writes.

Evelyn Johnson, M.D., of the Human Serum Laboratory has entered pediatric

practice in St. Louis Park. She has retained her connection with the Department of Pediatrics in another capacity.

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2. MINNESOTA PATHOLOGICAL SOCIETY

The University of Minnesota
Medical School
Institute of Anatomy
Tuesday, Dec. 17, 1940, 8:00 P.M.

The coagulation of blood with special reference to vitamin-K therapy.

Dr. H. P. Smith, University of Iowa.

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3. BABIES

TO: Dr. and Mrs. Francis Lynch,
baby girl Mary Adeline, Dec. 11.

Dr. and Mrs. Ralph Rossen,
baby girl Fredricka, Dec. 10.

- - -

4. WINTER PROGRAM

Center for Continuation Study,
Medical, Hospital Service, and
Public Health Courses.

January	2- 4	Problems of Executive Housekeepers.
January	20-25	Ophthalmology
January	27-Feb. 1	Hospital Administration
February	3- 5	Uterine Bleeding
February	13-15	Medical Social Service
February	20-22	Dietetics
March	3- 5	Internal Medicine (probably Deficiency Disease - Dr. W. B. Castle, Harvard, and others)
March	6- 8	Obstetric and Pediatric Nursing or Care of Newborn and Premature Infants for Minnesota physicians or Extension of three day course of Internal Medicine.

Other courses may be announced.

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IV. HAZARDS OF THE INLYING CATHETER

Baxter A. Smith

The catheter is a blessing which must be guarded closely or it will backfire. The single passage of a catheter in the absence of infection, trauma, or residual urine is not dangerous. The inlying catheter, however, because of the underlying pathologic condition for which it is used, has certain hazards.

Dangers are of two types: Immediate local reactions, and delayed infections of the upper urinary tract. Either may be serious but the latter may be more crippling; indeed, the cause of death a number of years later.

The inlying catheter is used for three main purposes: to allow drainage of the bladder when the patient is unable to void satisfactorily, to allow rest of the urinary tract during repair of damage, surgical or otherwise, of or about the urinary tract, and to dilate urethral strictures. As the catheter is used by services other than urology, the first use is by far the most important and it is with this purpose we will concern ourselves in this discussion.

Many males and a few females cannot void when flat in bed whereas they have no difficulty when they assume a sitting posture. Other patients have had mild symptoms of vesical neck obstruction prior to becoming bed-ridden and when ill, do not have sufficient force to initiate urination or empty the bladder. Patients who have undergone operations, particularly abdominal operations, are frequently subject to complete or partial retention of urine partly because of pain associated with tensing of the abdominal muscles to initiate micturition and probably in part to neurogenic factors and administration of drugs (morphine and atropine). Finally some patients are just too ill to coordinate in voiding, or, if they do void, to care where or when; this aids the formation of decubiti and the contamination of regional wounds. Neurogenic vesical dysfunction is a common occurrence in neurologic conditions and mild neurologic changes

may cause negligible obstruction which may bring about marked difficulty in urination.

A word regarding the dangers of overdistention is fitting at this juncture. Retention of urine, when not associated with neurologic changes, causes small hemorrhages beneath the mucosa and between the muscle bundles. This leads to damage which further decreases the ability of the bladder to overcome the cause of the retention. For this reason postoperative patients should not be allowed to go for a long period of time while various methods are tried to initiate urination. Bumpus¹ states that overdistention prepares the soil for infecting organisms and when the postoperative patient has a chill or febrile reaction following catheterization, overdistention rather than catheterization is at fault. Not infrequently, patients, particularly women void but have a large amount of residual urine. Because of the danger of infection of the residual urine, the bladder should be completely emptied.

The question of choice between inlying catheter drainage and repeated catheterization is one which is discussed with some feeling by advocates of each. There are points in favor of both. Middleton² has written earnestly in favor of intermittent catheterization, stating that the patient is more comfortable and active, and irritative and inflammatory cystitis and urethritis are minimized. Stalker and Schulte³ advocate intermittent catheterization of patients who have postoperative retention and have shown infection to be less. The inlying catheter is more comfortable for patients with appreciable dysuria or pyuria and for patients with marked frequency without retention. It allows continuous drainage which is very important once clinical infection is established in the presence of obstruction and probably is a better aid to the restoration of impaired renal function. It allows better control of the patient's fluid balance. All authors agree that if catheterization is difficult or traumatic, the inlying catheter is to be preferred. Those advocating intermittent catheterization suggest that it be carried out every

3 - 6 hours and p.r.n. for comfort and they have male nurses or trained orderlies available. If catheter drainage is necessary for more than 2 - 3 days, the inlying catheter, with proper care, is advisable in our opinion.

Local complications due to the catheter are not infrequent. These include periurethritis and periurethral abscess (with subsequent stricture or fistula), prostatitis, cystitis, and epididymitis. I believe we have all seen these complications; they may be more crippling than the condition for which the patient was hospitalized. This applies particularly to stricture formation. Two cases will suffice for illustration.

, aged 41. - This man was admitted upon a number of occasions in 1938 for marked hematuria due to sarcoma of the recto-vesical septum. During these admissions an inlying catheter of large calibre, often with traction, was necessary to prevent accumulation of clots. Radiation therapy has held the primary lesion fairly well in check to date, but strictures in the bulbo-membranous urethra necessitate frequent, difficult, and painful dilatations.

, aged 76. - This man developed symptoms of prostatism and began to catheterize himself, using a piece of 1/4 inch rubber tubing (apparently recommended by some of his friends). He continued catheterization for 6 months when passage of the catheter became so difficult that he stopped one month before admission; he voided frequently and in drops. He had had chills intermittently for six months. Uremia was present at the time of the first admission and there was an impassable stricture in the membranous urethra. Suprapubic cystostomy was performed, convalescence from which was stormy. Re-admission was necessary to pass a filiform and dilate the urethra; the suprapubic fistula was allowed to close during the hospital stay. Although the residual urine is small, prostatectomy will probably be necessary. In all, this patient has spent 27 days in the hospital to get back to his condition prior to catheterization except that urethral dilatations will be

necessary the rest of his life.

Local complications will be discussed further in connection with prophylaxis.

Acute pyelonephritis may follow the introduction of the catheter; however, one cannot say post hoc, ergo propter hoc because of the underlying pathologic condition necessitating catheterization. Certainly we have all seen many cases of pyelonephritis where no instrumentation has been done; catheter drainage is used in the treatment of pyelonephritis associated with vesical neck obstruction. However, there is no doubt that the incidence of pyelonephritis rises with the use of catheters. With the modern urinary antiseptics, acute pyelonephritis may be successfully treated if there is no underlying condition as stasis, stone formation, or impaired renal function.

Probably the most serious complication of catheterization is the introduction of infection by one of the urea-splitting organisms. The importance of organisms which split urea has been recognized for years but Chute⁴ states that most urologists do not realize the magnitude of the danger incident to infection by these bacteria. The most common urea-splitters are *B. Proteus*, *B. Pyocyaneus*, and strains of *Staphylococci*, *Non-hemolytic Streptococci*, *B. Influenzae*, and *Micrococcus Flavus*. He states that *E. Coli* may at times split urea, and this bacillus usually makes its appearance at some time in any renal infection of long standing. *B. Proteus* is the worst and most tenacious of these offenders, and, to make it more embarrassing, *B. Proteus* and *B. Pyocyaneus* are rarely found in the absence of previous instrumentation. Usually, patients requiring instrumentation have disease of the urogenital tract, are bedridden, or for other reasons are not well able to sterilize the urine without help.

The urea-splitting bacteria break urea down to ammonia which alkalinizes the urine; alkalinity decreases the solubility of calcium, and triple and amorphous phosphates and calcium carbonate tend to precipitate. Urine is a supersaturated solution of crystalloids; 6000 cc. of distilled water at 22° C. are required to

dissolve the average daily excretion of calcium oxalate, 30 mg. Why urine may be a supersaturated solution is a long and vague problem. Snapper⁵ and his associates have shown urea to be a hydrotropic substance, one whose presence increases the solubility of another compound. Colloids of undetermined nature keep the otherwise insoluble salts in solution by causing molecules of these salts to adhere to the colloid particles; a shift in the colloid content of urine apparently may result in precipitation of the salts. When urea is split to ammonia, its hydrotropic action is lost.

Chute found urea-splitting bacteria in 65% of 66 cases of urinary calculus cultured when first seen. 67% of those with infection due to urea-splitters had multiple or recurrent stones. There were 26 cases of recurrent stones, and 80% of these patients had urea-splitting organisms. *B. Proteus* was present in 60% of urea-splitting infections. Lett⁶ found proteus bacillus present in 12.2% of 636 cases of urinary calculi. This corresponds well with the figures presented in other large series. Stones recur in a very high percentage of cases in which urea-splitting organisms were present originally or were introduced during convalescence. Recurrent stones are not uncommonly found upon X-ray examination prior to discharge. Various authors report sterile urine in from 10 to 60% of cases of uro-lithiasis; however, the more recent writers doubt that the figure should be as high and believe that repeated cultures must be sterile to exclude infection. Swift-Joly⁷ believes, however, that most renal and ureteral stones are laid down in sterile urine.

The presence of infection, as shown by Lubash⁸, provides the nucleus for stone formation. Bacteria, leucocytes, necrotic tissue, blood clots, and fibrin form a mass upon which crystals are deposited. The difference of surface tension of the nidus and of the wall of the neighboring renal pelvis promotes the adherence of crystals.

Stasis in the urinary tract has been well recognized as a large factor in the

promotion of infection and in the resistance of the infection to attempts at eradication. The type of stasis usually meant is that secondary to disease in the urinary tract such as vesical retention of urine due to diverticula, vesical neck obstruction, renal retention due to hydronephrosis secondary to pregnancy, ureteropelvic obstruction, etc.

The problem of stasis due to recumbency is probably of most importance to us. Pulvertaft⁹, Pyrah and Fowweather¹⁰, and others have written extensively upon this subject. Most of the patients reported are those immobilized because of lesions of bone or chronic wasting disease. Because of the anatomical position of the kidney, in the immobilized, recumbent patient, there is stasis of urine in the dependent calices of the kidneys. In the immobilized patient the skeleton decalcifies to a varying degree and Mawson¹¹ and others have shown the urine and blood calcium to be high in these patients (Mawson studied children with tuberculous bone disease and found that the serum calcium rose from an average of 10 mg.% upon admission to 11.7 - 25 mg.% after a period of recumbency). Bedridden individuals tend to have a small fluid intake leading to concentration of the urine; heliotherapy increases this and also the absorption of calcium. In Pulvertaft's series of 60 cases, the stones disappeared in 27% when the patients became ambulatory. In no case in which infection was demonstrable did the stones disappear, however. In 9 cases pelvic- or nephrolithotomy was done; nephrectomy was necessary in 3 cases; and 7 patients died, 3 directly and 3 indirectly from urinary complications. Since spinal cord injuries with residual paralysis lead to an invalid type of life and usually affect the bladder sufficiently so that instrumentation is carried out at some time, it is a common rule that these patients will succumb to renal disease within five years of the injury.

Before prophylaxis is discussed, it might be well to cite a few examples of what may follow infection of the upper urinary tract.

Case 1.

..., aged 28. This man was first admitted 11-21-38 for the purpose of plastic surgery to the left renal pelvis for non-calculus obstruction of the ureteropelvic junction. He had had attacks of left-sided colic and hematuria since July 1938. Catheterization and cystoscopy had been carried out in the outpatient department; upon admission the urine contained *B. Proteus* for the first time, but was otherwise negative. The day after admission the left kidney was explored and two strictures, one at the ureteropelvic junction and the other 2 cm. lower, were found; Schwyzer-Foley Y-plasty was done. The administration of sulfanilamide was begun on the 5th postoperative day. On the 12th postoperative day the patient complained of right flank and lumbar pain and roentgen examination showed multiple granular shadows in the region of the right renal pelvis whereas there had been none on previous examinations. This pain was relieved by ureteral catheter drainage. Acidification of the urine was brought about and the urine had been acid to methyl red solution for one week at the time of discharge 12-24-38. KUB films prior to discharge did not show any calcification in the region of either kidney and the left nephrostomy was closed. The patient was instructed to ingest an acid ash diet and continue acidification of the urine.

He was readmitted in March 1939 with a history of right renal colic in attacks for 4 days. He had passed and caught a small calculus. The urine from the bladder and from each kidney contained proteus bacilli. He was treated by ureteral catheter drainage and was given sulfanilamide until afebrile and then the acidification regime was again begun. Films revealed multiple small soft calculi in the right kidney.

The patient was readmitted in August, 1939 stating that in the interim he had passed a number of stones and had many attacks of right colic and hematuria; pyuria and symptoms of vesical irritation were present. Excretory urogram showed multiple soft calculi on the right with no definite function. There was impassable obstruction to the passage of an

ureteral catheter. Pelviolithotomy and ureterolithotomy were performed; because of marked inflammation, primary nephrectomy was not considered safe and it was hoped the kidney might be saved by conservative surgery. Death occurred from hemorrhage that night.

B. Proteus was introduced into this man's urinary tract in the hospital since outpatient urine cultures were negative for this organism. It is worthy of note that there was X-ray evidence of stone in the right kidney 12 days after surgery on the left. It is quite probable that the introduction of *B. Proteus* occurred with catheterization or at cystoscopy. (Is this the reason this patient is not well today?)

Case 2.

..., aged 27. This man was admitted 9-29-39 and expired 4-14-40. He had acute anterior poliomyelitis involving all four extremities and the intercostal muscles. Because of retention of urine he had indwelling catheter for about one month. The first urine culture contained *E. Coli*, *Staphylococci Aureus*, and *Gamma Streptococci*. After the acute stage of the poliomyelitis the patient was transferred for orthopedic care. Urine culture 2-14-40 showed *B. Proteus* to be present. The first sign of notable urinary difficulties aside from those on admission, which had in the meantime disappeared, was left renal colic 3-7-40 when KUB films revealed bilateral renal calculi. Ureteral catheter drainage afforded relief; they were removed 3-16-40. Cultures showed *B. Proteus* in the urine from both kidneys. Acidification was unsuccessful. The patient ran a moderately febrile course and 4-14-40 expired in acute pulmonary edema after 36 hours of anuria; urology staff did not see him during the period of anuria. Autopsy showed pulmonary edema and obstruction of both ureters by stone; pyelonephritis with multiple abscesses was present.

This case demonstrates the danger of recumbency and infection introduced by catheterization. The stones in both

kidneys were multiple.

Case 3.

, aged 33. This man suffered fractures of the 7th and 8th thoracic vertebrae and of the pelvis in an automobile accident in 1935. There was paralysis of the lower extremities and the patient lost sensation of bladder and bowel. He was treated for two months with inlying catheter and after that voided by straining. Residual urine was unknown but at the time of admission here, six months after injury, the residual measured 250 cc. There had been some improvement in the loss of function of the legs. During orthopedic therapy catheterization was necessary and pyelonephritis appeared. Suprapubic cystostomy was performed. At the time of discharge there had been little improvement in neurologic changes.

After returning home, involvement of the extremities improved so that the patient walked well using a cane. Bladder sensation also returned and the patient spent two years with an inlying catheter closing his suprapubic fistula. Following its closure, he again voided by straining. Hematuria and pyuria appeared and the patient began to pass calculi per urethram. Much instrumentation had been done and when admitted here in July, 1940, the patient had been bedridden for three weeks and he complained of bilateral lumbar pain when voiding. Uremia was present and diagnosis of bilateral pyonephrosis, interstitial cystitis, false passages in the prostatic urethra, and perivesical cellulitis was confirmed after death, 6 days after admission. No calculi were present. The urine contained only B. Coli upon culture.

This man was in fairly good general condition except for his crippled urinary tract, and upon his last admission the vesical sensation and expulsive force seemed normal. He illustrates the above-mentioned rule; he finished his five years.

Case 4.

J. S., aged 47. In January,

1939, this man suffered a fractured skull and fractures of the 12th thoracic and 1st lumbar vertebrae when he was injured in an automobile accident. He was unconscious for 3-4 weeks and during this time, the bladder was drained by means of an inlying catheter. The patient was told that there was blood in the urine after the accident. A plaster jacket was worn from April to May following which a brace was used. Hematuria was present upon several occasions between April and June, and in June the patient had the first of a number of left renal colics. There had been no pain upon the right; the patient had frequency, dysuria, and gross pyuria. To the patient's knowledge he had passed no stones.

Physical examination was negative except for the appearance of chronic illness and rather marked costo-vertebral tenderness upon the left. The urine contained 1+ albumin and numerous red and white cells in the sediment. Renal function was normal and the catheterized urine contained B. Proteus. Intravenous urography revealed normally functioning kidneys with bilateral calculi.

September 25, 1939 left pelviolithotomy and nephrostomy were performed. During convalescence sulfanilamide was administered orally to tolerance, the blood level reaching as high as 19 mg.%. The nephrostomy was irrigated with azochloramide solution and silver nitrate. At the time of removal of the nephrostomy tube 10-20-39, two consecutive cultures of urine from the left kidney were negative for B. Proteus. He was discharged taking nitrohydrochloric acid and consuming an acid ash diet.

The patient was readmitted 1-10-40. During the interim he had had several bouts of fever. The bladder urine contained B. Proteus. Roentgenograms showed calculi in the right kidney but none in the left. Two days later right pelviolithotomy and nephrostomy were performed. Sulfanilamide did not eradicate the proteus infection upon the right but sulfathiazol did and two con-

secutive cultures were negative for B. Proteus before the nephrostomy was allowed to close. The bladder urine still contained B. Proteus at the time of discharge 2-24-40. When last seen in June 1940, the patient had no complaints; the urine contained no pus cells, and two cultures of bladder urine were negative for B. Proteus.

Following recovery from his accident, this man had a normally functioning bladder, B. Proteus, and bilateral renal calculi. He is fortunate that he is apparently cured.

Case 5.

..., aged 41. This man was first seen in the outpatient department in December 1936 at which time he had multiple complaints including backache when working. Left ureteral dilatation had been carried out 6 years before and was followed by intermittent hematuria for one month. Examination of the urine was negative; excretory urograms revealed bilateral hydronephrosis due to deformity of the ureteropelvic junction. After a trial of ureteral dilatations, Y-plasty was done upon the right and the accessory vessels were cut. Convalescence was marred by persistence of nephrostomy fistula which closed only after passage of a calculus. The patient had pelvio-ureteroplasty upon the left in June of 1938; no accessory vessels were present. The urine prior to this was sterile. He was discharged 6-22-38 and returned 8-7-38 with left renal colic and a calculus 1x1.5x1 cm. was present in the left renal pelvis. The urine contained proteus bacilli. Pelviolithotomy was performed and the urine was sterilized with sulfanilamide followed by acidifications. The patient has been followed closely and has no urinary complaints except occasional burning due to prostatitis. The urine is sterile and negative microscopically; his functional complaints are, however, still present.

Note: The introduction of B. Proteus was followed shortly by the formation of renal stone.

Case 6.

..., aged 36. In 1931 this man had left renal colic and hematuria treated with morphine. Occasional colics occurred and in 1933 vesical papillomata were said to have been fulgurated. In 1934 a stag-horn calculus was removed from the left kidney by pelviolithotomy elsewhere. Before discharge following this operation, roentgenograms showed a recurrent calculus to be present. Symptoms recurred two years later, and increased in severity. He was admitted to this hospital in March of 1940.

Physical examination was negative except for slight left renal tenderness. The urine contained very many pus cells and B. Proteus. Renal function was normal. Excretory urogram showed reduplication of pelvis and ureter on the right and many large calculi in a poorly functioning left kidney. Following nephrectomy and the administration of sulfanilamide and sulfathiazol the urine became negative for pus and B. Proteus and when last seen in November, 1940, the patient had no complaints and roentgen examination showed no change upon the right.

Case 7.

..., aged 26. This patient was admitted 9-16-39 suffering from acute anterior poliomyelitis with paralysis of all extremities and the intercostal and abdominal muscles. She required the respirator for all but a few minutes of each day for four months. At the time of admission she was three months pregnant. An inlying catheter has been necessary since admission because of retention and later, incontinence.

During the duration of pregnancy, various urinary antiseptics were administered in sufficient dosage to control pyuria and the patient remained afebrile. On 2-13-40 a normal term infant was delivered by Caesarian section. Although urinary antiseptics were continued, during convalescence acute pyelonephritis developed and KUB films revealed multiple

calculi in the right kidney. It is difficult to estimate when these might have formed, but it is interesting that in pyelonephritis associated with renal stasis of pregnancy, stone formation is uncommon.

Ureteral catheter drainage has been almost continuous since then. B. Pyocyanus and left renal calculi appeared. Dissolution of the stones was attempted using various medications. On 9-17-40 left nephrostomy was done and sandy calculi were washed out of the pelvis and calices. Chemotherapy has not been vigorously employed since May, 1940. The renal pelvis and the bladder have been irrigated with citric acid-sodium citrate solution and the left renal stones remaining after nephrostomy and the right stones have decreased in size and number. Pyocyanus infection has been killed. When the patient's condition will permit, right nephrostomy will probably be done. The size of the right kidney has decreased considerably due to pyelonephritis. We hope to be able to control the status of the urinary tract satisfactorily after a period of time. The respirator is required now only because of mucus secondary to nausea during flare-ups of renal infection.

Case 8.

, aged 21. This student was catheterized three times following an automobile accident in 1936. He had an episode of fever, malaise, and weakness lasting four weeks in 1939. He was admitted in August 1940 complaining of chills, fever, cough, frequency, and dysuria. Examination was negative except for fever and suprapubic tenderness. The urine contained 1+ albumin; there were very many pus cells in the sediment. Culture of the urine showed B. Pyocyanus alone to be present. Excretory urograms were negative. Following the administration of sulfanilamide, the urine became sterile and negative for pus.

Since Bacillus Pyocyanus is almost never found in the urinary tract in the absence of instrumentation, the bout of pyelonephritis was probably secondary to catheterization four years before.

Prevention

A discussion of prophylaxis is probably the major value of a contribution of this type. Catheters and connectors must be carefully sterilized; Chute has pointed out the fact that Proteus Bacilli enjoy residence in rubber tubing and vigorously fight eviction. All catheters, rubber tubing, connectors, and reservoir bottles must be autoclaved; although B. Proteus is usually killed easily by heat, in rubber tubing it can be frequently cultured after boiling. The rubber tubing which we use is cheap, yet stiff enough to prevent kinking. It is never used for more than one patient, and to prevent further use is cut up into small segments and discarded. Indwelling catheters, after removal, are cleansed with soap and water using forcible syringing, and are cleansed with benzene, then a piece of gauze is drawn through the catheters using a wire to remove particles; if a catheter is too small, it is cut up and discarded. The catheters are soaked in dilute acetic acid, again rinsed with soap and water and autoclaved. Glass connectors, rubber corks, and reservoir bottles are treated in like fashion. Sterility of all material is checked by culture periodically. Soft catheters which are liable to kink readily are discarded.

Males are prepared for catheterization by cleansing the penis and applying alcohol to the glans for about one minute. Females are prepared by cleansing with bichloride of mercury solution to which sodium oleate is added. Forceps technique, touching only the distal two inches of the catheter with the fingers, is quite satisfactory. The catheter should be well lubricated and gently introduced. If it is to remain for continuous drainage, in the male it should be of the Robinson (two hole) type, and in the female it should be a malecot or mushroom catheter. Catheters in the male should not exceed 20 F. in size, and 16 is better; 20 to 24 F. is satisfactory in the female.

Catheters in the male are tied in, using four narrow strips of adhesive applied to the catheter and the penis,

allowing room for any urethral drainage to occur. These strips are anchored to the catheter using a piece of linen thread and a strip of tape; they are anchored to the penis by a piece of two inch tape long enough to loosely surround the penis back of the glans. The Foley (bag) catheter is preferable if available. In the female the catheter is anchored by pieces of linen thread tied at the exit from the labia and taped to each inguinal region and each gluteal fold. Before tying in a catheter it must be adjusted to give comfort and free drainage. Indwelling catheters should be changed weekly at least.

We prefer a closed system which permits irrigation and is sterile throughout. The top bottle contains irrigating fluid and the amount used may be measured from day to day in computing output; between irrigations it is kept clamped off. It is connected by a Y tube to the tubing leading from the catheter to the sterile bedside bottle. There should be sufficient tubing between the Y tube and catheter to permit free motion of the patient. Tubing should be pinned to the bed so that its weight may not drag on the catheter. If the patient is to be moved, the tubing is disconnected at the catheter and the glass connector is wrapped in a sterile fluff held by a rubber band. The catheter is attached to a small sterile bottle. Emmett¹² has discussed care of the urethral catheter.

Whenever a catheter is first introduced, a culture of the urine should be taken and renal function determined. If the urine is presumably sterile, Stalker and Schulte have shown that sulfanilamide gr.v t.i.d. will keep it sterile or hold infection at a minimum. The urine should be examined every 2-3 days for pus and cultured weekly.

During a period of indwelling catheter drainage in the male, the urethra, scrotal contents, and prostate should be examined frequently. If periurethritis appears, it should be treated by chemotherapy and hot packs; however, if it is severe or progresses, suprapubic cystostomy may be necessary. Periurethral abscess, prostatitis, and epididymitis

should be treated in the generally accepted manner. Patients with pre-existing chronic infections of the lower genitourinary tract, including the epididymis and cervix uteri, as well as those developing acute infections should be watched closely. Winsburg-White¹³ examined the lower genito-urinary tract for staphylococcal infection in 115 cases of stone in the upper urinary tract and found such foci in 72%.

Hospital patients are recumbent most of the time. Since recumbency associated with infection of the urinary tract by urea-splitting bacteria (and usually the catheter is used because of some temporary or permanent urinary pathology) gives almost ideal conditions for the formation of stone, this becomes a tremendously important matter. Patients immobilized in plaster should be encouraged to move their muscles to prevent skeletal decalcification; they should be turned frequently to prevent stasis in the calices. Intake of fluids in all patients should allow adequate urinary output to "flush the kidneys." A liberal diet particularly high in vitamin A should be taken, and if a long period of recumbency is anticipated, the diet should be of an acid ash type. Higgen's high vitamin acid ash diet is widely accepted.

Once infection has occurred, if the period of catheter drainage is to be short and the infection is not clinical, therapy is usually unnecessary if the patient is closely observed following removal of the catheter; in the absence of stasis, stone, etc., these patients will usually sterilize their urine. If the infection is clinical or the period of drainage is long, proper antiseptics, as determined by the culture, are indicated. If urea-splitters are present, they should be attacked vigorously whether the infection be clinical or not. Treatment should not be stopped until at least two consecutive cultures are negative for the urea-splitter. *B. Proteus* is readily killed by adequate acidification (below pH 5.4) and mandelic acid if pyuria is not present. However, once it has a foothold, it tenaciously resists attack; we have found sulfathiazol most

effective in clinical infection due to this organism. It might be added that ammonium chloride is probably an unsatisfactory drug to use in acidification against urea-splitters; Chute states the increased urea formed from ammonia feeds the flame by being broken down to ammonia in the urine, thus defeating the administration of the chloride. All infections of the urinary tract should be followed until the urine is free from pus and preferably until it is sterile, necessarily until sterile if urea-splitters have been present.

Summary

1. Local complications of the indwelling catheter have been discussed with illustrative cases of possible results.
2. Upper urinary tract complications have been discussed and illustrative cases presented.
3. Prophylaxis as practiced here has been brought out, with a special plea for eradication of infection by urea-splitting bacteria.

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V. GOSSIP

Esther M. Andreasen, University of Minnesota graduate in Nursing, and past president of the Minnesota Nurses' Association, was killed on the highway near Elk River as she was driving from St. Cloud to Minneapolis. The accident happened November 14, and I am sorry to say I just learned of it. At the time of her death, she was Director of Public Health Education for the City Health Department in Duluth. I spent a very enjoyable evening with her at the Nurses' Association Banquet October 19. She was admired and respected by everyone. The cause of public health lost an able worker when her life was snuffed out...Lewis M. Daniel writes as follows: "Dear Bill It's ashamed I am to be caught napping when little Michael is born Hannah joins me in sending love and good luck to another O'Brien of which God knows there isn't enough of them and I hope Mrs is well...When our Patrick arrived, he also wrote a classic in Hibernian lore which we treasure very much...Center for Continuation Study Director Julius M. Nolte once wrote a letter to the assistant to the President, Dean Malcolm Willey, which was also expressed in Hibernian manner. My name and picture had appeared in the paper as the Director of the Center for Continuation Study, a position which is very ably filled by Mr. Nolte, himself. He wrote: Oh, Willey, dear, and did you hear the news that's going 'round? The Irish are on the loose again and claiming all the ground....News from England via Mrs. Edward Clive Butler, the former Nancy Harrison, daughter of Senator and Mrs. Harold Harrison, 3525 Irving Avenue South was brought to us in a series of letters published in the Minneapolis Sunday Tribune, November 24. Nancy graduated here in Medical Technology in 1935. Among other things, she states that she is organizing a blood grouping service and standardizing the sera. Much of the news is about bombing, tea, and making jams and jellies. She hopes that their new car will not be smashed in the garage. The English pluck is evident in all her descriptions of their patients, including one of a smiling lad of $4\frac{1}{2}$ with a skull fracture whose entire family had been killed. She speaks of the great accuracy with

which the Germans seem to be able to hit hospitals and old people's homes. To console the people in a statistical manner, she tells of a sign above the fire place in a pub where the food is very good. It says, "There is one pigeon for every 90 inhabitants in the London area. If 100,000 pigeons so rarely score a direct hit why worry about the Germans"? Nancy has become very British and refers to the cinema as the "flick" which reminds me that the blind people out near our house call one another "blinks." One is impressed with the similarity of their medical work with accident problems here. Director of the orthopedic division, Wallace H. Cole will soon be leaving for England to take Dr. Wilson's place as head of the American Orthopedic Unit. They also need another Minnesota Medical Tech over there. Please see Dr. Cole... Last Sunday at the Milwaukee station, screen and stage star K. Hepburn strode through the station dressed in her familiar brown slacks and mink coat. She had to compete with the Hiawatha streamliner and the Rocket Zephyr. Behind her, at a respectful distance, came her lady-in-waiting and a very nondescript looking dog. Ladies with dogs always intrigue me. The other morning I was reading Gertrude Stein on Paris, France, and she devotes quite some space to French women and their dogs. They are called very lovely names. While a French man never feels he has lived unless he has a family, a French woman does not mind being referred to as the mother of her dog. Very touching was one passage in which a French woman at a concert spoke to her dog seated on her lap about the possibility of the dog's not liking the flute solo which was to follow...Speaking of actresses, Johns Hopkins Barker's daughter visited us a few weeks ago in one of our road shows (The Man Who Came to Dinner). Her father gave her a list of physicians whom she might call in any city in case of necessity. The list was said to contain 800 names....Christmas is just around the corner and with it will come a very full program of extra-curricular activities at the hospital. We hope to have some information for you about the Christmas program for next week. Final examinations for this quarter start today, Friday the 13th. The students feel this could not make a great deal of difference in their luck.....