

POSTPARTUM BLADDER COMPLICATIONS

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THE postpartum bladder occasionally shows the effects of the efforts and accomplishments of the uterus. It has been acutely compressed during late pregnancy; its attachments have been markedly stretched by uterine enlargement. Recovery from such rough handling sometimes takes longer than what we consider as normal. Such cases form our group of postpartum bladder complications.

The conditions which primarily concern us are (1) acute retention of urine, and (2) bladder residual in those who are voiding apparently normally. Bladder residual urine is determined by catheterization immediately after the patient voids, measuring the amount of urine obtained. Acute retention is self-evident. Acute cystitis may accompany either of the two conditions just mentioned. It will also be discussed.

Recognition of such complications as well as the admission of the possibility of occasionally overlooking such conditions was admirably stated by Chamberlain¹ in 1877. He said, "This form of cystitis is very common * * * . I believe I have often overlooked it, confounding its subjective symptoms with afterpains, its tender hypogastric tumor with a sensitive uterus, its turbid urine with urine contaminated by lochial admixture or vaginal secretions. Rarely is there a painless hyperdistention of the bladder to such an extent that we might suppose meteorism was present, did not the fluctuating tumor

soft but dull on percussion, and the *stillecidum urinae*, but especially the catheter readily conduct us to the true diagnosis."

As Chamberlain wrote fifty years ago, so today postpartum bladder complications are occasionally overlooked. Cases of unexplained puerperal temperatures, cases which are diagnosed questionable pelvic sepsis, will frequently be found carrying a bladder residual which is definitely responsible for the fever. It is this group especially which has been interesting from the standpoint of diagnosis and treatment.

The study upon which this paper is based includes 58 postpartum cases from the Urological Service of the Boston Lying-In Hospital, observed during the years 1925, 1926, and 1927, which required treatment of the bladder for two or more consecutive days.

Fifty-eight cases comprise 1.1 per cent of the number of deliveries at the hospital during that period. Of these 58 patients, 87.6 per cent were primiparae. A history of previous trouble with the urinary tract was obtained in only 6.9 per cent. The average length of labor was twenty and a half hours. The types of delivery were given as follows:

Normal	9	15.52 per cent
Low Forceps	24	41.39 "
Mid Forceps	9	15.52 "
High Forceps	4	6.89 "
Breech	5	8.62 "
Internal Podalic Version	4	6.89 "
Cesarean	3	5.15 "
	<hr/> 58	<hr/> 100.00 per cent

Perineal tears were listed as follows:

No tear	13	22.42 per cent
First degree	13	22.42 "
Episiotomy or second degree	32	55.16 "
	<hr/> 58	<hr/> 100.00 per cent

From a study of the records, it does not seem likely that any one type of delivery is responsible for bladder complications, or that perineal lacerations play any part as causative factors.

ACUTE RETENTION

In a series of 157 puerperal cases, Taussig² found that 3.8 per cent required catheterization for acute retention. He quotes cystoscopic studies of acute retention bladders by Stoeckel and Ruge who found definite edema around the internal sphincter. Shutter³ quotes further studies by Ruge who concluded that postpartum bladder difficulties were in direct proportion to the amount and severity of injury to the bladder wall at delivery. Schmitz⁴ and others have found that during

pregnancy and the puerperium, the bladder has an increased capacity and is not as sensitive to a definite amount of urine or fluid as in the nonpregnant.

One seems justified from the facts known today in believing that no single factor is responsible for acute retention in these cases. Injury to the bladder wall from pressure or stretching of adjacent tissues, the paralyzing effect of the anesthesia, the increased bladder capacity, and the temporarily disturbed function of the nerves to the bladder as the result of delivery are probably the principal factors.

There are 39 cases of acute retention in this series, forming 67.24 per cent of the bladder complications. Data for this group are tabulated in Tables I, II, and III. The acute retention was relieved by catheterization. The smallest amount of urine obtained at initial catheterization was 10 ounces, the largest amount 69 ounces, or an average of 32 ounces.

Of these 39 cases with acute retention, 24 or 61 per cent had temperatures above 99° before catheterization was done, the highest being 101°. Of the 24 with temperature, 13 had had sediment examination of a catheter specimen, 9 of which were normal, 4 containing a moderate number to many W.B.C. Of the 14 cases of acute retention with normal temperature 9 cases had had examination of the urinary sediment, all of which were negative.

We may say that acute retention with rise in temperature before treatment may or may not show evidence of infection in the urinary sediment. In this group all cases of acute retention without rise in temperature before treatment had normal urinary sediments.

Two types of treatment were used in this series; namely, intermittent drainage, and constant drainage. In all these cases suprapubic and perineal heat, pituitrin or benzyl benzoate had failed to induce urination. The instillation of air, borated glycerin, and other mild irritants into the bladder have been employed by others without promising results in acute retention, and were not used in this series of cases.

Intermittent drainage was accomplished by catheterization every eight hours until the patient began voiding in satisfactory amounts. From that time catheterization for residual was done twice each twenty-four hours until the residual was found to be less than 1½ ounces. Catheterization was done aseptically and followed by a bladder irrigation with warm boric acid solution.

For constant drainage, a self-retaining catheter, size 18 or 20 F., was inserted into the bladder with a stylet. Bladder irrigations with warm boric acid solution were done once per day. Constant drainage was maintained usually until after the patient's temperature had been normal for twenty-four hours, and for a period sufficient for the bladder to regain its tone. Within twenty-four hours after the re-

TABLE I. ACUTE RETENTION. TREATMENT: INTERMITTENT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERATURE BEFORE TREATMENT	NUMBER OF DAYS OF TREATMENT	HIGHEST TEMPERATURE DURING TREATMENT	NUMBER DAYS TREATMENT BEFORE NORMAL TEMPERATURE	URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS
1	34425	45	7	100 ²	6	?	many W.B.C.	none
2	37060	36	5	98 ⁶	10	?	few W.B.C.	none
3	34692	10	2	100 ⁶	4	?	?	none
4	34931	14	4	99 ⁴	4	many W.B.C.	many W.B.C.	none
5	35794	61	5	100	7	?	many W.B.C.	none
6	38321	?	9	99 ⁶	7	many W.B.C.	?	none
7	38376	?	7	99 ⁵	8	?	?	none
8	33362	?	14	97	13	negative	many W.B.C.	none
9	33425	20	6	100	6	negative	negative	none
10	33714	?	7	99 ⁴	10	negative	many W.B.C.	none
11	34484	50	5	99	5	?	?	none
12	38355	45	3	98 ⁶	0	?	?	none
13	36730	42	4	100	13	negative	many W.B.C.	Rt. pyelitis-clinically
14	36304	?	2	100 ⁶	4	few W.B.C.	many W.B.C.	? pelvic sepsis
15	33438	?	9	99 ⁸	14	?	many W.B.C.	Sapremie uterine infection

Uncomplicated Cases: Average number days of treatment 5.33
Average number days before temperature normal 6.66

TABLE II. ACUTE RETENTION. TREATMENT: CONSTANT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERATURE BEFORE TREATMENT	NUMBER OF DAYS OF TREATMENT	HIGHEST TEMPERATURE DURING TREATMENT	NUMBER	URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS	
					DAYS TREATMENT BEFORE NORMAL TEMPERATURE				
1	35382	16	4	104	3	negative	many W.B.C.	none	
2	37038	14	5	99 ⁴	4	many W.B.C.	many W.B.C.	none	
3	38086	18	4	102 ⁶	4	many W.B.C.	15 W.B.C.	none	
4	38237	58	4	100 ⁴	11	?	?	none	
5	36578	16	10	100 ⁸	10	negative	many W.B.C.	none	
6	37854	64	12 ²	100 ²	8	negative	many W.B.C.	none	
7	37961	?	15 ³	100 ⁸	13	negative	many W.B.C.	Uterine sepsis	
Uncomplicated Cases: Average number days of treatment					6.5				
Average number days before temperature normal					6.66				

TABLE III. ACUTE RETENTION. TREATMENT: INTERMITTENT AND CONSTANT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERATURE BEFORE TREATMENT	INTERMITTENT DRAINAGE		CONSTANT DRAINAGE		NUMBER DAYS TREATMENT BEFORE NORMAL TEMPERATURE	URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS	
			NUMBER DAYS	HIGHEST TEMPERATURE	NUMBER DAYS	HIGHEST TEMPERATURE					
1	34758	64	98 ⁶	5	100 ⁸	5	99 ⁸	9	negative	negative	none
2	34846	27	101	4	101 ⁴	6	100 ⁴	7	moderate no. W.B.C.	many W.B.C.	none
3	34991	?	100	5	101 ²	7	100 ²	10	negative	few W.B.C.	none
4	36562	62	100 ²	3	102 ⁶	2	99 ⁶	7	negative	many W.B.C.	none
5	36665	?	99 ²	3	100 ²	5	99 ⁶	5	?	many W.B.C.	none
6	36794	42	98 ⁶	5	100	4	99 ⁶	6	?	?	none
7	36811	?	101	3	100 ⁴	5	100 ²	7	many W.B.C.	many W.B.C.	none
8	37461	50	98 ⁶	4	100 ⁸	10	99 ⁶	14	?	many W.B.C.	none
9	37540	?	99 ²	4	98 ⁶	6	99 ⁴	10	negative	few W.B.C.	none
10	38194	22	?	2	98 ⁶	2	99 ⁶	4	negative	?	none
11	38202	10	99 ⁴	1	100 ⁴	7	101	10	?	?	none
12	38360	44	99 ⁴	1	99 ²	6	101 ⁴	8	?	?	none
13	38638	69	99 ⁶	3	101	4	101	7	?	?	Bilateral pyelitis—
14	33776	?	100 ⁴	7	104	5	105	15	?	many W.B.C.	clinically
15	34357	?	?	4	105	6	103	28	?	many W.B.C.	Bilateral pyelitis— cystoscopically
16	37230	28	98 ⁴	4	104	8	104 ²	9	negative	many W.B.C.	Left pyelitis— clinically
17	36735	16	98 ⁶	3	100	+	?	?	3-5 W.B.C.	40 W.B.C.	Bilateral pyelitis— cystoscopically

Uncomplicated Cases: Average number days intermittent drainage 3.07
Average number days constant drainage 5.3
Average number days before temperature normal 8.

removal of the catheter, the bladder residual was measured and if more than $1\frac{1}{2}$ ounces were obtained, constant drainage was again instituted. This form of bladder treatment is very comfortable and much less annoying than frequent catheterization.

The number of days of treatment in all the cases may be taken as the time necessary for the bladder to regain its ability to empty itself, as treatment was not discontinued until a residual of less than $1\frac{1}{2}$ ounces was demonstrated immediately after voiding. The time for constant drainage may be slightly longer than actually necessary, due to the inadvisability of removing the catheter daily, testing for residual, and perhaps finding it advisable to replace it.

Exclusive of complicated cases, the average number of days of treatment by intermittent drainage alone (Table I) was 5.33 days compared with 6.5 days by constant drainage alone (Table II). The average number of days before temperature remained below 99.2° , was the same under each method, namely, 6.6 days.

As shown in Table III, 17 cases were treated by intermittent drainage from 1 to 5 days, then put on constant drainage until relieved. Such a change was not anticipated when intermittent drainage was begun, but was done either because the temperature was higher than desired, or, the bladder residual was not decreasing satisfactorily. In this group, the average length of the combined treatment was 8.1 days. Eight days were required before the temperature remained normal (Table III).

There were 5 cases of postpartum pyelitis which complicated these 39 cases of acute retention, 12.8 per cent. This of course is much higher than the average incidence of postpartum pyelitis. One case occurred with intermittent drainage alone. The four pyelitis cases in Table III began the pyelitis while the patient was on intermittent drainage treatment. It should be noted that in this group of acute retention cases, no upper urinary complications arose with a patient on constant drainage.

NONACUTE RETENTION WITH BLADDER RESIDUAL

Residual bladder urine during pregnancy and puerperium in patients voiding ordinary amounts has been recognized for some time. In contrast to postpartum cases we have seldom found a bladder residual of more than $\frac{1}{2}$ ounce during pregnancy, although Stevens and Arthur⁵ reported $33\frac{1}{3}$ per cent of pregnant women carrying bladder residuals. Curtis⁶ has found bladder residuals in 64 per cent of postpartum cases after the return of spontaneous voiding.

Holsteks' work, quoted by Shutter,³ refers to 30 unselected postpartum cases who were catheterized daily for one week after delivery. The average residual one day after delivery was 107 c.c. for primiparae, 58 c.c. for multiparae. One week later the average residual was 14 c.c.

TABLE IV. NONACUTE RETENTION. TREATMENT: INTERMITTENT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERATURE BEFORE TREATMENT	NUMBER OF DAYS OF TREATMENT	HIGHEST TEMPERATURE DURING TREATMENT	NUMBER DAYS TREATMENT BE- FORE NORMAL TEMPERATURE	URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS
1	36198	101 ²	2	101 ²	1	few W.B.C.	few W.B.C.	none
2	36323	101	2	101	3	few W.B.C.	few W.B.C.	none
3	38031	101	4	100 ⁶	13	many W.B.C.	few W.B.C.	none
4	32943	100 ⁸	11	101 ⁶	5	negative	negative	none
Uncomplicated Cases: Average number days of treatment					4.86			
Average number days until temperature normal					5.5			

TABLE V. NONACUTE RETENTION. TREATMENT: CONSTANT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERATURE BEFORE TREATMENT	NUMBER OF DAYS OF TREATMENT	HIGHEST TEMPERATURE DURING TREATMENT	NUMBER DAYS TREATMENT BE- FORE NORMAL TEMPERATURE	URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS
1	35034	102	4	98 ⁴	1	negative	many W.B.C.	none
2	35585	102	4	102 ²	2	many W.B.C.	many W.B.C.	none
3	37792	101	2	99 ⁴	1	negative	many W.B.C.	none
4	37703	101 ⁸	4	100	1	many W.B.C.	few W.B.C.	none
5	38088	103	3	101 ⁴	3	few W.B.C.	?	none
6	38166	100 ⁶	3	100	1	negative	negative	none
7	39029	102 ⁴	3	102	5	negative	few W.B.C.	none
8	35661	105	13	103	17	negative	many W.B.C.	Rt. pyelitis— clinically
9	38174	104	20	?	24	negative	many W.B.C.	Rt. pyelitis— cystoscopically

Uncomplicated Cases: Average number days of treatment 3.28
Average number days until temperature normal 2.

TABLE VI. NONACUTE RETENTION. TREATMENT: INTERMITTENT AND CONSTANT DRAINAGE

CASE NO.	AMOUNT RESIDUAL OZ.	TEMPERA- TURE BEFORE TREAT- MENT	INTERMITTENT DRAINAGE		CONSTANT DRAINAGE		NUMBER DAYS TREATMENT BEFORE NORMAL TEMPERATURE	URINE SEDIMENT BEFORE TREATMENT	URINE SEDIMENT DURING TREATMENT	COMPLICATIONS			
			NUMBER DAYS	HIGHEST TEMPERA- TURE	NUMBER DAYS	HIGHEST TEMPERA- TURE							
1	35158	35	99 ⁶	3	100 ⁴	4	100	7	negative	many W.B.C.	none		
2	35168	+	100	2	102 ⁴	4	101	6	?	few W.B.C.	none		
3	35895	17	101	2	101 ⁶	4	101	5	many	W.B.C.	many W.B.C.	none	
4	36398	66	99 ^s	2	99 ²	6	100	5	?	many	W.B.C.	many W.B.C.	none
5	32781	30	102	3	100 ^s	3	99	4	many	W.B.C.	many W.B.C.	none	
6	32697	15	99	3	103 ⁶	9	104	8	many	W.B.C.	many W.B.C.	Bilateral pyelitis cystoscopically	
Uncomplicated Cases:		Average number days intermittent drainage						2.4					
		Average number days constant drainage						4.2					
		Average number days before temperature normal						5.4					

in primipara, and 7.5 c.c. in multiparae. Factors responsible for these residuals are no doubt similar to factors already mentioned as responsible for acute retention.

Patients with postpartum bladder residuals often refer to suprapubic or perineal discomfort, frequent urination, dysuria, or a feeling of not having emptied the bladder. Frequently they void in small amounts. In a number of cases the residual will be of sufficient quantity to give a palpable bladder. Occasionally it is difficult to differentiate by palpation between the bladder and a subinvolved uterus. The bladder is usually distinctly softer, with a less sharply defined upper margin, and is flat to percussion. Catheterization will either confirm or deny ones opinion concerning the mass.

Nineteen cases in this group, 32.76 per cent of the bladder complications did not have acute retention but had bladder residuals varying from 3 to 66 ounces. The average residual was 28 ounces. These cases are tabulated in Tables IV, V, and VI. All of these patients had temperatures over 99°, the highest in the otherwise uncomplicated cases being 103°. Temperatures of 100° to 102° were common. In these cases, no other cause for temperature could be found. Urinary sediments before treatment were normal in 7, showed a moderate number to many W.B.C. in 8, 4 not examined. Bladder residual as a cause of postpartum temperature is well worth keeping in mind.

The intermittent drainage cases averaged 4.86 days of treatment against 3.28 days for the cases treated with constant drainage. An average of 5.5 days were necessary to reach essentially normal temperature in cases treated with intermittent drainage, in contrast to only two days in those treated with constant drainage (Tables IV and V).

Table VI shows 6 cases in which intermittent drainage was begun but later changed to constant drainage. The reasons for changing were the same as given above for Table III. Average length of treatment was 6.6 days, requiring an average of 5.4 days for temperature to reach and remain normal.

There were 3 cases of postpartum pyelitis complicating these 19 cases, 15 per cent, again much higher than the average incidence of postpartum pyelitis. Two cases occurred in patients on constant drainage, one case on intermittent drainage. In all the 58 cases here tabulated, there were 8 cases of postpartum pyelitis, 6 of which occurred with intermittent drainage, 2 with constant drainage. We believe that acute retention or a bladder residual in the postpartum cases is conducive to pyelitis.

The catheter plays such a dominating part in the diagnosis and treatment of these conditions that its frequent use must be justified. In the past the catheter has been held responsible for cystitis following acute retention. There is sufficient evidence to change such an opinion as to the cause of so-called "catheter cystitis." Introduction

of bacteria into a normal bladder does not cause infection. Curtis⁷ has long maintained that residual urine proves favorable for bacterial growth and was the most important factor in this type of cystitis. Cabot⁸ believes that the tissues of the distended bladder wall become devitalized from pressure and interference with the venous return. Such tissue is much less resistant to bacterial invasion and offers a fertile field for growth. Distention of the bladder may cause small lacerations in the mucosa and permit a bacterial entry.⁹ These factors combined with the congestion following relief of the retention furnish grounds to absolve the catheter as the cause of cystitis in such cases. Bladder infection would probably be reduced if catheterization were not postponed to the point of an overdistended bladder. The proper and timely use of the catheter will decrease the incidence in this type of cystitis rather than cause it.

While the follow-up work on the 1925-26 cases has not been entirely satisfactory, there are a sufficient number of cases to believe that after these postpartum bladders begin to empty themselves, the urine sediment which perhaps showed pus either before or during treatment becomes negative within two months.

In determining the value of a certain treatment for postpartum bladders, the following points must be considered: (1) speed in getting the bladder capable of emptying itself, (2) effective reduction of temperature, (3) negative urine as soon as possible, (4) avoidance of upper urinary complications.

It is our opinion that constant drainage accomplishes these results more effectively in the nonacute retention cases which carry bladder residuals than does intermittent drainage, as shown in Tables IV and V. This form of treatment is recommended in such cases. In cases of acute retention, constant drainage has not brought an existing temperature down more rapidly than intermittent drainage and in this series its use has been necessary slightly longer to relieve the bladder residual. However, postpartum pyelitis occurred less frequently in the constant drainage cases. For acute retention, intermittent drainage as outlined is advised, instituting constant drainage at the end of forty-eight hours, if there still exists a bladder residual, or elevated temperature which seems due to the urinary complication.

I wish to express my appreciation to Dr. E. G. Crabtree who first advised the use of constant bladder drainage in this clinic, to Dr. F. S. Newell, and to the Residents and House Officers for their cooperation in this study.

CONCLUSIONS

1. Postpartum bladder complications are sometimes overlooked.
2. Unexplained postpartum fever may be due to bladder residual.
3. Of the bladder complications 87.6 per cent occur in primiparae.
4. No one type of delivery is responsible.

5. Injury to bladder wall at delivery, increased bladder capacity, and temporarily disturbed function of nerves to the bladder are believed to be responsible.

6. Treatment advised for acute retention is intermittent drainage as outlined, changing to constant drainage after forty-eight hours if there is still a bladder residual over $1\frac{1}{2}$ ounces, or a fever otherwise not explained.

7. Treatment advised for nonacute retention bladders having a residual is immediate constant drainage.

8. Cystitis in such cases is due to residual urine and to injury to the bladder mucosa from overdistention or trauma rather than to the catheter.

9. Acute retention and bladder residual predisposes to postpartum pyelitis.

REFERENCES

(1) *Chamberlain, Wm.*: Am. Jour. Obst., April, 1877, x, 190. (2) *Taussig, F. J.*: Surg., Gynec. and Obst., October, 1915, xxi, 416. (3) *Shutter, H. W.*: Jour. Am. Med. Assn., Aug. 5, 1922, lxxix, 449. (4) *Schmitz, E. F.*: Jour. Missouri Med. Assn., March, 1923, xxi, 61. (5) *Stevens, W. E., and Arthur, E.*: Jour. Am. Med. Assn., November 22, 1924, lxxxiii, 1656. (6) *Curtis, A. H.*: Jour. Am. Med. Assn., April 21, 1923, lxxx, 1126. (7) *Curtis, A. H.*: Jour. Am. Med. Assn., May 6, 1916, lxvi, 1456. (8) *Cabot, H.*: Jour. Iowa State Med. Soc., April, 1923, xiii, 153. (9) *Ballinger, E. G., and Elder, O. F.*: South. Med. Jour., April, 1927, xx, 321.

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