PREVENTION OF THIRST FOLLOWING ABDOMINAL OPERATIONS.[2]

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(With chart.)

Of the minor complications following abdominal operations, thirst is one of the most common and in some cases is exceedingly distressing. I can recall numerous instances where patients have resorted to every means possible to obtain water.

[1] Centralblatt für Gynäkologie, No. 17, 1896, p. 441.

[2] Read before the ninety-eighth annual meeting of the Medical and Chirurgical Faculty of Maryland, April 28th to May 1st, 1896.

One patient, a negress, in the wards of the Johns Hopkins Hospital, after an exceedingly grave operation, got out of bed, while the nurse was absent a few moments from the room, and crawled to a water cooler some distance away.

The rule usually followed by surgeons in abdominal-section cases is to withhold liquids for twenty-four hours until the patient is free from nausea and vomiting, after which water is given in small quantities.

The large amount of waste products which is thrown off through the various excretory channels following an abdominal operation causes intense thirst, especially in those cases where there is no compensatory ingestion of liquids to offset the depletion caused by the dehydration of the tissues from the evaporation of the ether in the lungs and its elimination by the kidneys and other excretory organs. The mere administration of ether without operation is often followed by intense thirst. Add to this factor a prolonged operation, with more or less loss of blood, and we have three potent co-operating causes for the production of this complication.

Numerous plans have been suggested to prevent thirst, among the latest one by Dr. Humiston, of Cleveland. His plan is to place the patient on a greatly increased water diet for three days before operation, thus hoping to store up sufficient residual water to tide the patient over the first twenty-four hours after operation.

This plan is no doubt of service in cases where it is possible to put it into effect, but in the usual hospital practice and in many operations performed in private houses it is not feasible, because in many instances the case is an emergency one requiring operation within twenty-four hours after being seen by the surgeon.

This is especially true in gunshot wounds of the abdomen, appendicitis, ectopic pregnancy, etc., and it is in these cases that thirst is the most intense, and vomiting, which prevents the ingestion of water, the most frequent.

It has been the practice for many years in medical and surgical cases to administer water in small quantities by the rectum where, for any reason, it was impossible for the patient to take fluid by the mouth ; but, so far as I know, the routine injection of saline solution (0.6 per cent) as a systematic procedure for the control of thirst after abdominal operations has not been used.

The employment of fluid enemata, the injection of salt solu-

tion into the subcutaneous tissues and into the peritoneal cavity, is resorted to where, on account of some disease, such as cholera, large quantities of fluid are discharged by the bowels, kidneys, and sweat glands.

For the last two years it has been a part of the concluding technique of every abdominal operation performed in the Gynecological Department of the Johns Hopkins Hospital to inject one litre of normal salt solution into the lower bowel, and the result has been so very satisfactory that we now propose to adopt it for all operations, even of minor degree.

In order that the patient may retain the enema *she must yet be under the anesthetic when it is given*, otherwise the bowel will not tolerate such a large quantity of liquid. For this reason it is impossible to give liquids in sufficient quantities in the conscious subject to be of any great service in assuaging the thirst.

At the conclusion of the operation, before the abdominal dressings are applied, the patient is elevated to the moderately high Trendelenburg posture, a stiff rectal tube is inserted well up into the sigmoid flexure, and the fluid slowly poured into a glass funnel, which is held three or four feet above the level of the patient's buttocks.

In this posture the solution gravitates downward into the sigmoid flexure and the descending colon, and is very rarely expelled, even as a result of the most violent attacks of retching and vomiting during the recovery from anesthesia.

I have reviewed the special charts of one hundred abdominal-section cases which have not had, and one hundred cases which have had, the saline enemata, and am able to report the most gratifying results, not only in the alleviation of thirst, but also in the reduction to a minimum of vesical irritability, which is so common in operative cases.

One or two months after the adoption of this plan the head nurses in the gynecological wards began to report the most remarkable improvement in the intense thirst usually experienced by patients after abdominal section.

Up to this time the nurses had not been informed of the means being employed to prevent this complication, as we desired to obtain an unsolicited and unbiassed report from them. From this time on, however, they were instructed to make the most critical observations concerning the presence or absence of thirst, and in the one hundred charts, which I have taken at random from our history files, there is very rarely any note other than that the patient passed her first twenty-four hours without even asking for water.

Another most conclusive evidence of the beneficial effect of these enemata is shown by the increase in the urinary excretion. Reference at this point to Dr. Russell's paper on "Urinary Analysis in Gynecology," published in the *Johns Hopkins Hospital Reports*, 1894, is of especial interest, as the urinary excretion of one hundred abdominal cases under the new regimen shows a most remarkable increase over that noted by Dr. Russell.

In Dr. Russell's paper he attributed the frequency of vesical irritability in post-operative cases to the retention of small quantities of highly concentrated urine in the bladder, which possessed more than the normal amount of organic salts with greatly decreased watery constituent.

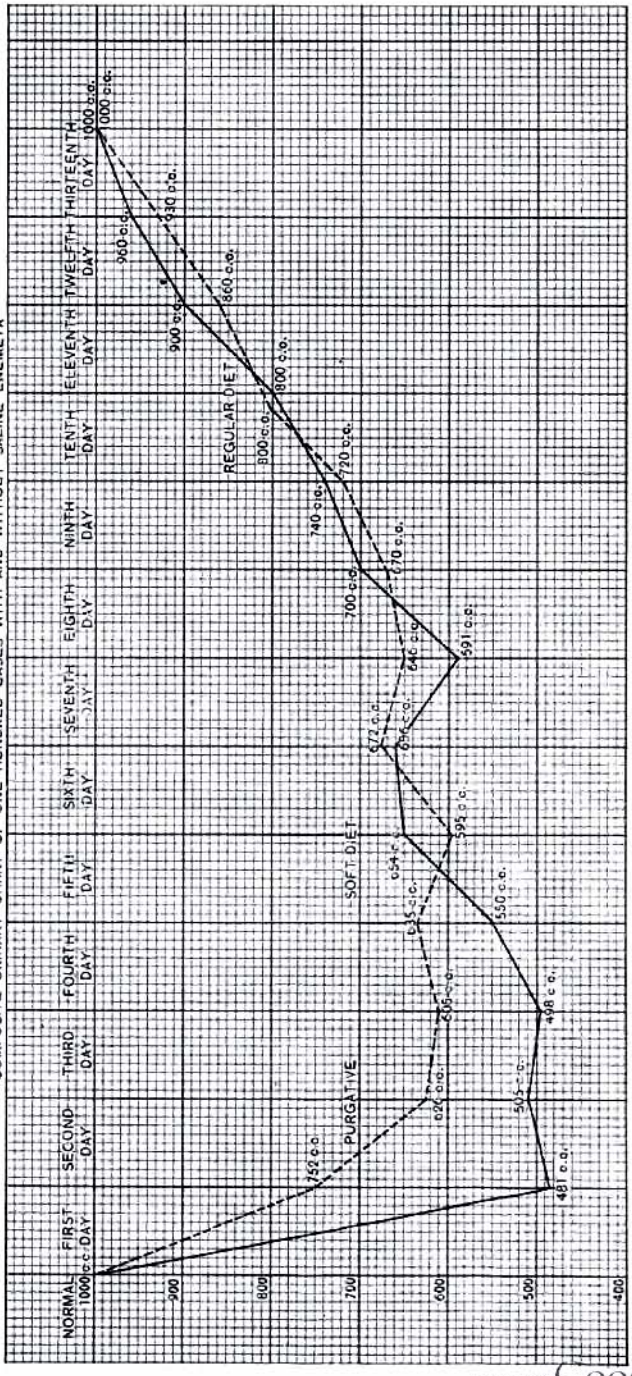
This hypothesis is unquestionably a correct one, as vesical irritability is comparatively rare in the cases of the last year. Catheterization is much less frequently required, and consequently the occurrence of post-operative cystitis is greatly decreased.

The natural result of almost doubling the watery constituent of the urine is to decrease the specific gravity. The specific gravity of cases in which the enemata are not given ranges between 1025 and 1030, while those with it show a reduction to an average of 1021.

The physical characteristics of the urine in the two series are also markedly different. As would be expected, the urine with high specific gravity is of a reddish-brown color, at times almost suggesting hemoglobinuria, and after standing deposits a heavy stratum of reddish sediment consisting largely of the phosphatic salts and urates. The urine of the cases in which the saline solution is given usually presents a normal color, and where more than 900 cubic centimetres are voided in the first twenty-four hours it may even have the clear, limpid appearance of a urine deficient in solid constituents.

The average daily quantity of urine excreted for the first seven days after operation, in the two series of cases, is as follows:

With Saline Enemata.		Without Saline Enemata.	
First day,	752 cubic centimetres.	First day,	481 cubic centimetres.
Second "	626 " "	Second "	505 " "
Third "	605 " "	Third "	498 " "
Fourth "	635 " "	Fourth "	550 " "
Fifth "	595 " "	Fifth "	654 " "
Sixth "	672 " "	Sixth "	656 " "
Seventh"	646 " "	Seventh"	591 " "



The normal daily excretion of urine in gynecological cases when they are admitted into the wards is below the normal (1,200 to 1,500 cubic centimetres). rarely being higher than 1,100 cubic centimetres.

The average quantity in fifty cases which I have had carefully measured is 1,000 cubic centimetres. In constructing the accompanying composite urinary chart I have assumed this quantity to be the normal. This chart brings out a number of interesting points. In following the two lines as they descend from the basal line, the wide difference in the amount excreted by the cases with and without the enemata is seen at a glance.

The first series of one hundred cases shows an average of 752 cubic centimetres at the end of the first twenty-four hours, while the second shows but 481 cubic centimetres.

The solid line (cases without enemata) drops to its lowest point on the first day, and for three days does not rise much above the point, while the broken line (cases with enemata) shows a greater excretion the first day than for seven subsequent days. It is not until the end of the fifth day that the excretion in the two series of cases is of equal amount.

This chart not only furnishes a graphic illustration of the comparative progress of the two series of cases with regard to the urinary excretion, but in other symptoms as well. It is frequently urged as an objection to the administration of morphine in post-operative cases that it "locks up the secretions" and thus retards convalescence. Looking at this question from the standpoint which this chart presents, it would appear to be a lack of sufficient water supplied to meet the deficit caused by the increased metabolism following operation, and not to the slight inhibition of the secretory function of the various glands from the effects of the morphine. In the treatment of cases immediately after serious operations performed in the Gynecological Department of the Johns Hopkins Hospital, we do not hesitate to use small doses of morphine, repeated if necessary, if the patient is in great pain, and in no case has there been a perceptible diminution in the urinary excretion under that usually observed in cases which do not have this drug.

A further study of this composite chart reveals other interesting points. In both series of cases the least amount of urine is excreted during the third day (605 cubic centimetres in one, 498 cubic centimetres in the other), which is readily accounted for by the fact that it is the routine practice to administer a saline purgative on the evening of the second day, which

EFFECTS OF NORMAL SALINE

CASES IN WHICH SALINE ENEMATA WERE NOT USED.

No.	Name.	Gynecological number.	Disease.	First twenty-four hours.	Second twenty-four hours.	Third twenty-four hours.	Fourth twenty-four hours.	Fifth twenty-four hours.	Sixth twenty-four hours.	Seventh twenty-four hours
1	M. C.	1333	Ventral hernia; hydrosalpinx	230	680	400	450	820	700	600
2	L. S.	1335	Retroflexio uteri	520	580	680	200	750	1210	1000
3	H. H.	1807	Ventral hernia	440	490	530	780	670	650	810
4	F. M.	1819	Myoma uteri	600	410	500	430	320	430	400
5	K. Z.	1822	Papillomatous ovarian cyst	425	300	325	425	350	400	400
6	G. B.	1828	Ventral hernia	410	615	1080	470	600	800	690
7	L. C.	1830	Retroflexio uteri	310	380	240	310	510	500	600
8	A. S.	1832	Myoma uteri	628	810	690	430	700	340	400
9	D. McK.	1833	Pyosalpinx	470	420	380	570	750	350	600
10	M. M. M	1834	Hematoma ovarii	360	320	280	490	660	875	620
11	E. W.	1840	Hydrosalpinx	305	560	550	640	620	810	630
12	W. W.	1846	Hydrosalpinx	600	550	520	660	520	780	700
13	E. D.	1855	Papillary cyst	330	315	455	730	640	700	500
14	T. L.	1859	Pyosalpinx	420	490	620	400	590	400	540
15	E. S.	1723	Carcinoma	470	480	640	630	645	710	900
16	B. C	1896	Myoma uteri	260	310	520	420	470	680	700
17	G. B.	1816	Ovarian abscess	420	580	350	400	590	620	850
18	B. W.	2016	Pelvic abscess	390	360	420	330	520	620	560
19	A. R.	2042	Fibroma ovarii	600	420	540	590	520	640	700
20	K. H.	2045	Tuberculous peritonitis	365	540	495	620	915	630	500
21	C. K.	1995	Retroflexio uteri	600	585	415	920	700	640	600
22	M. W.	1990	Peritonitis	450	490	630	970	900	650	700
23	K. S.	1985	Salpingitis and perioöphoritis	390	540	350	410	400	880	780
24	G. G.	1983	Salpingitis and perioöphoritis	360	460	400	380	520	610	555
25	C. B.	1980	Pyosalpinx	400	360	310	420	500	600	600
26	K. H.	1808	Salpingitis and perioöphoritis	420	640	580	780	670	490	700
27	H. L.	1812	Myoma uteri; parovarian cyst	640	870	780	410	660	1480	1200
28	M. L.	1828	Parovarian cyst	580	590	520	480	870	720	800
29	E. P.	1829	Myoma uteri	800	880	620	640	680	840	900
30	L. B.	1832	Ovarian abscess	560	400	550	350	540	540	700
31	E. S.	1509	Ventral hernia	370	540	450	610	570	610	650
32	H. B.	1519	Sarcoma ovarii	380	700	700	880	1000	950	875
33	C. J.	1527	Hydrosalpinx	560	360	510	590	670	710	750
34	L. B.	1528	Salpingitis and perioöphoritis	1020	750	960	1300	1100	1000	1050
35	K. G.	1530	Pyosalpinx	780	350	400	390	400	400	550
36	M. R.	1532	Pelvic abscess	490	680	400	520	500	700	700
37	H. M.	1541	Carcinoma peritonei	510	740	500	500	520	420	600
38	S. C.	1540	Myoma uteri	540	440	450	500	620	920	850
39	G. H.	1542	Salpingitis and perioöphoritis	900	510	440	400	500	500	650
40	B. P.	1544	Peritonitis	360	580	675	720	590	700	720
41	C. P.	1550	Carcinoma ovarii	450	400	360	260	800	890	840
42	L. R.	1560	Salpingitis and perioöphoritis	370	620	460	660	1100	800	875
43	L. R.	1570	Pericecal abscess	500	480	670	750	680	700	650
44	E. K.	1578	Salpingitis and perioöphoritis	400	350	450	200	500	400	575
45	M. C.	1579	Myoma uteri	380	600	570	920	750	1300	1100
46	K. M.	1582	Retroflexio uteri	600	450	320	490	900	550	600
47	B. M.	1595	Retroflexio uteri	400	280	440	790	1080	500	575
48	L. R.	1597	Salpingitis and perioöphoritis	750	740	750	700	960	1000	1100
49	E. C.	1645	Ovarian abscess	550	500	420	510	400	450	550
50	A. M.	1685	Myoma	390	380	690	280	500	890	900

usually acts on the third day. The diminution is therefore a normal physiological one, due to the hydragogue action of the purgative.

Soft diet is begun on the fifth and sixth days, and as a result there is another drop in the two lines, as the patient then begins to take more of soft than of liquid diet.

At the end of the fifth day the excretion in both series of cases is equal, and from this time the two lines travel together

ENEMATA ON URINARY EXCRETION.

CASES IN WHICH SALINE ENEMATA WERE USED.

No.	Name.	Gynecological number.	Disease.	First twenty-four hours.	Second twenty-four hours.	Third twenty-four hours.	Fourth twenty-four hours.	Fifth twenty-four hours.	Sixty twenty-four hours.	Seventh twenty-four hours.
1	E. N P.	4020	Myoma uteri	1300	690	620	690	525	615	815
2	A D.	3994	Myoma uteri	880	560	375	440	540	320	300
3	E. W.	3842	Myoma uteri	500	550	465	450	540	1010	940
4	N. E.	3950	Myoma uteri	980	630	500	710	680	850	810
5	M. W.	3977	Myoma uteri	700	570	440	780	370	575	690
6	M. C.	3967	Myoma uteri	780	600	490	580	710	1010	1140
7	T. S.	3928	Myoma uteri	520	360	300	950	580	760	700
8	S. C.	3918	Myoma uteri	720	520	310	840	540	620	480
9	J. H.	3775	Pyosalpinx	490	285	385	220	360	480	525
10	V. S	3985	Hydrosalpinx	900	530	380	475	490	460	500
11	M. B.	3882	Myoma uteri	1940	1820	900	630	850	810	800
12	H J.	3575	Dermoid cyst	610	600	580	740	440	460	420
13	M. A.	3484	Myoma uteri	715	400	290	435	410	610	520
14	J. P.	3462	Carcinoma uteri	620	660	715	580	660	1500	655
15	L P.	3976	Inguinal hernia	1110	745	710	380	475	550	700
16	C. J.	3999	Myoma uteri	980	690	925	495	440	950	850
17	E. R.	3004	Retroflexio uteri	1050	480	620	550	780	730	1160
18	L. N.	3991	Myoma uteri	580	700	460	800	900	540	600
19	M. B.	3948	Retroflexio uteri	450	590	710	750	650	790	500
20	A. E S.	3998	Retroflexio uteri	720	1180	1080	920	790	880	550
21	A M.	3942	Myoma uteri	780	660	560	430	840	690	770
22	E. H.	4021	Gall stones	640	800	390	730	740	720	680
23	C. F	4000	Pyosalpinx.	980	370	600	390	550	650	600
24	T McN.	4100	Cystic ovary	850	850	910	330	480	770	710
25	M. S.	4085	Myoma uteri	620	400	1160	500	950	920	645
26	M. T. A.	4084	Retroflexio uteri	600	560	480	580	500	630	570
27	N. J. L.	4108	Retroflexio uteri	500	650	480	660	480	400	500
28	A. D. S.	4058	Retroflexio uteri	570	600	420	685	840	710	700
29	J. P. R.	4083	Salpingitis and perioöphoritis	730	605	400	690	600	770	980
30	L. H. K.	4068	Suppurating myoma	550	315	480	690	540	455	480
31	J. B.	4065	Retroflexio uteri	960	655	820	940	600	545	625
32	E. S.	4154	Salpingitis and perioöphoritis	870	920	240	650	250	600	300
33	L Y.	4158	Tubo-ovarian cyst	550	570	580	400	400	610	400
34	M. R.	4128	Ovarian cyst	780	670	450	420	770	600	650
35	C. W.	4145	Ovarian cyst	710	410	770	350	400	710	705
36	M A. B.	4149	Hydrosalpinx	630	690	670	1020	700	650	700
37	E P.	4070	Carcinoma uteri	790	420	485	750	490	380	300
38	M. H.	4076	Cystoma ovarii	1080	1180	980	850	740	860	520
39	L. O.	4064	Appendicitis and peritonitis	810	765	665	740	740	540	690
40	K. S.	4058	Hydrosalpinx.	540	640	1160	780	630	880	450
41	L. D.	4040	Retroflexio uteri.	670	630	990	640	450	420	520
42	E. B.	4018	Purulent peritonitis	550	180	350	755	680	650	670
43	E. D.	4022	Myoma uteri	1290	660	820	640	690	800	855
44	K. P.	4040	Inguinal hernia	600	585	505	760	455	730	600
45	L. W.	4026	Retroflexio uteri	630	570	1080	730	520	760	710
46	A. C.	3900	Cystoma ovarii	590	380	220	475	430	600	320
47	M. W.	3906	Retroflexio uteri	750	550	630	530	760	660	550
48	M. M.	3909	Ovarian cyst	1400	900	660	960	700	800	630
49	C. C.	3912	Ovarian cyst	550	480	430	650	605	600	700
50	A H.	3901	Retroflexio uteri	705	560	690	540	570	500	550

until they again reach the normal base line on the twelfth to thirteenth day.

There appears to be a further explanation for the greater excretion of urine in the cases which have the saline enemata than that it is merely due to an increase in the amount of water taken into the system.

The nausea and vomiting following anesthesia usually disappears by the end of the first twenty-fours hours, after which

the imbibition of water has not been restricted in either series.

Notwithstanding the fact that in both series of cases about the same quantity of water is taken by the mouth, the excretion in one remains very low for three days, at no time being above 505 cubic centimetres, while the other shows not less than 600 cubic centimetres, or over 100 cubic centimetres more urine passed daily by the patients who have had the enemata. From this observation it would appear that the persistent renal torpidity is due to the irritant or toxic effects of the greatly concentrated urine, and by supplying the body with a litre of salt solution this partial suppression is to a great extent prevented, and the kidney at once resumes its normal function as soon as the patient begins to take water.

The accompanying table of two series of fifty cases, with the record of the daily excretion in each individual case, emphasizes the fact which the composite chart brings out.

In thirty-five of the fifty cases with the enemata the excretion during the first twenty-four hours was greater than it was on the seventh day after operation, while in forty cases without enemata the excretion was less during the first day than during the seventh, the figures in the former being almost exactly reversed in the latter. The following table, taken from these two series of cases, also shows the same result:

Urine excreted.	With enemata. Cases.	Without enemata. Cases.
1,000 cubic centimetres or over	7	1
900 " " " "	5	1
800 " " " "	3	0
700 " " " "	12	2
600 " " " "	9	7
500 " " " "	11	8
400 " " " "	2	14
300 " " " "	1	15
200 " " " "	0	2
100 " " " "	0	0
	Total, 50	50

The entire relief from the intense thirst following abdominal operations, in a great majority of cases, by the simple injection of the saline enemata, is a much stronger proof of the efficiency of this means than the mere citation of statistics. Since the adoption of this plan we feel that thirst can almost entirely be eliminated as a post-operative complication.

My thanks are due Dr. Kelly for his encouragement and permission to put into effect and to study the plan above reported.