

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

Prolonged Anesthesia

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during the school year, October to June, inclusive.

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Alumni and Friends.

William A. O'Brien, M.D.

I. LAST WEEK

Date: May 29, 1942

Place: Recreation Room  
Powell Hall

Time: 12:15 to 1:30 p.m.

Program: "Kenny Treatment of Infantile Paralysis"

M. E. Knapp

Discussion  
Irvine McQuarrie  
A. B. Baker  
H. Hatch  
John Adams  
M. E. Knapp

Present: 105

Gertrude Gunn,  
Record Librarian

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II. BABIES

1. Dr. and Mrs. Alphonse Walch, a boy, Michael Francis, born May 6.
  2. Dr. and Mrs. George Levitt, a boy born May 9.
  3. Dr. and Mrs. Karl Andresen, a girl, born May 31.
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III. SENIOR MEDICAL PROGRAM

Special summer lecture series will include a discussion of war medicine, Monday, Wednesday, Friday 8:00-8:50 a.m. all divisions. Series starts June 17, and continues to close of quarter.

Tropical medicine for section A will be given Tuesday and Thursday from 3:00-5:00 p.m. in the fall quarter and for division B, C on Mondays and Wednesdays from 3:00 - 5:00 p.m. in the winter quarter. Orientation to Practice for all divisions will be Fridays from 3:00 -

3:50 p.m. in the fall quarter.

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IV. MEETINGS

The Minnesota Society of Neurology and Psychiatry met in Rochester, Minn. on Saturday, May 23, 1942 under the presidency of William T. Peyton. There was a surgical clinic from 8:00-10:30 by Drs. Adson, Love, and Baker, followed by a program of papers by J. R. Brown, C. L. Yeager, J. R. Miller, J. W. Kernohan, P. I. Hoagland, and L. M. Eaton. The subjects included anomaly of the cerebellar vermis, electro-encephalographic differentiation of lesions of the frontal lobes of the brain, digestion of the stomach wall associated with intracranial lesions, a new staining method to demonstrate yeasts and mycelia in the meninges of the brain, acute porphyria: report of 2 cases with neurologic manifestations, and myasthenia gravis - movie to illustrate removal of thymic tumor.

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V. NEXT WEEK

June 12 will be the last meeting of the current series of general staff meetings. Spring quarter officially ends on June 12. Saturday, June 13, the 70th annual commencement will be held. The official opening date for the fall quarter will be Monday, September 28. The first staff meeting of the next series will be October 2.

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VI. CENTER FOR CONTINUATION STUDY

Diseases of Early Childhood (physicians)	June 8 - 10
Industrial Nursing Application of Hot Fomenta (nurses)	June 11 - 13
Kenny Treatment (physicians)	June 15 - 20
Application of Hot Fomenta (nurses)	July 6 - 11
Kenny Treatment (physicians)	July 13 - 18
Kenny Treatment (technicians)	Aug. 10 - 15
	To be announced.

## VII. ANALYSIS OF PROLONGED ANESTHESIA

John Grimm

Since we have an unusual number of difficult and complicated surgical procedures performed at this hospital, we thought that it would be of interest to make an analysis of these "long" cases. In this way we may find out just how the average patient undergoing a prolonged procedure reacts to his anesthetic and to his surgical operation.

We have arbitrarily selected 3 hours as a minimum time for a "long" operation and all the cases included in this survey are 3 hours or more. Realizing that one cannot compare two totally different types of surgical operations we have divided the cases into 6 groups: namely, brain, other neuro-surgery, chest, gastrectomy, other gastro-intestinal, and miscellaneous cases.

A total of 454 consecutive operations of 3 or more hours in length were done between January 7, 1939 and April 27, 1942. Sixty were brain cases, 27 other neurosurgery cases, 15 were chest cases, 155 were gastrectomies, 127 were other gastrointestinal cases, and 69 were miscellaneous cases. The brain and miscellaneous cases averaged 39 years in age; the chest cases were only 30 years; other neurosurgery cases, 50 years; gastrointestinal cases 52.5 years; and the gastrectomies topped the list at 63 years. These age groups are just what one would expect for each type of surgical procedure.

Of the total number of cases 226 were 3 to 4 hours duration, 117 were 4 to 5 hours duration, 60 were 5 to 6 hours duration, 37 were 6 to 7 hours duration, 7 were 7 to 8 hours duration, 3 were 8 to 9 hours duration, one was 9 to 10 hours, and one which was longest, was 10 hours and 15 minutes.

The average duration does not mean much since the short cases of each type were not considered. However it does indicate that there are more long cases in some types than others. Chest cases

were the longest at 5 hours and 54 minutes, brain next with 5 hours and 20 minutes, gastrectomies next with 5 hours and 6 minutes, other gastro-intestinal 4 hours and 6 minutes, and miscellaneous and other neurosurgery 3 hours and 36 minutes.

The preoperative hemoglobin was a quite uniform and favorable figure of 12.2 to 13.2 gm. per 100 cc. Plasma proteins were 6.5 to 6.9 gm. per 100 cc. except for chest cases which averaged 7.4 gm. and other neurosurgery cases which averaged 5.7 gm. or 18.5% below normal. (Table 1)

Table I

Type	Age	Dura- tion	Hgb. Gms.	Plasma Protein Gms.
Brain	39	5'20"	12.6	6.75
Other Neuro- surgery	49.7	3'42"	13.2	5.7
Chest	30	5'54"	12.3	7.42
Gastrectomies	63	5'06"	12.2	6.62
Other Gastro- intestinal	52.5	4'06"	12.3	6.93
Miscel- laneous	38.8	3'36"	12.7	6.48

One hundred eighty six cases received morphine sulfate while 216 received codeine sulfate and 251 received atropine sulfate while 171 received hyoscine hydrobromide. During much of the time of this series no brain or chest cases and no one over 50 years of age received morphine. Hyoscine was just beginning to be used. This accounts for the high incidence of codeine and atropine.

Of the anesthetic agents cyclopropano was utilized the most frequently; 85% in brain cases, 96% other neurosurgery, 53% chest, 93% gastrectomies, 98% other gastrointestinal, and 80% miscellaneous. Only 6 gastrectomies received spinals (3.8%). We have recently started giving spinal anesthesia for gastrectomy, supplementing it in every case with some form of general anesthesia at the outset. These pa-

tients clinically are doing better than those who used to get cyclopropane alone. (Table 2)

Table 2

	<u>M.S.</u>	<u>COD.</u>	<u>AT.</u>	<u>SC.</u>	<u>Cyclo.</u>	<u>Ethyl.</u>	<u>Ether</u>	<u>Helium</u>	<u>Oxygen</u>	<u>Pento.</u>	<u>Spinal</u>	<u>Trach.</u> <u>Tube</u>
Brain	11	41	47	12	51	18	3	3	59	6	0	55
Other Neuro- Surgery	11	15	11	12	25	2	1	0	26	6	1	22
Chest	3	11	12	3	8	2	0	9	12	6	0	9
Gastrec- tomies	58	71	71	58	144	42	2	18	144	7	6	136
Other Gas- trointesti- nal	58	65	74	50	126	32	2	20	126	3	7	101
Miscel- laneous	45	13	31	36	55	21	10	5	69	11	1	35
Total	186	216	251	171								

We are glad that this survey is made at the time when this change is made as a later review will give us a chance to compare the 2 methods.

Tracheal tubes were used in a large proportion of cases, 91% brain, 87.7% gastrointestinal, and 77% other gastrointestinal cases. Most of these tubes were the conventional McGill type with which an oral gauze pack is used. Some were tubes with cuffs which are cemented to the regular tube. These were found to be too bulky and rough. We have since developed a cuff which we make

ourselves which has many advantages over the old style cuff. This is inflated with air while connected to a water manometer to a pressure of 15 to 18 cm. of water. This system is practical in every way and has not caused any undue damage to the trachea or larynx.

The preoperative blood pressures were remarkably uniform, ranging from 121 to 133 systolic and from 69 to 77 diastolic. The oldest age group, the gastrectomies, were 125 over 73. Possibly the bed rest accounts for this low figure. (Table 3)

Table 3

	Preop.		High		Time	Low		Time	End	
	S	D	S	D		S	D		S	D
Brain	121	74	144	79	30"	76	52	2'30"	92	62
Other Neurosurgery	130	77	141	83	47"	88	55	2'30"	102	64
Chest	133	77	130	77	1'26"	90	55	2'55"	99	62
Gastrectomies	125	73	157	84	53"	102	67	2'55"	118	69
Other gastro- intestinal	122	69	150	81	56"	94	60	2'36"	112	69
Miscellaneous	121	72	142	81	44"	97	64	2'17"	111	69

The highest blood pressure reading during the entire anesthetic procedure was recorded and also the time at which it occurred. The average systolic readings for brain cases was 144, for gastrics, 157, for other gastrointestinal 150, for chest 130, and for miscellaneous 142. These figures follow the age curves closely. The diastolic readings were 77 to 84. The peak occurred 1/2 to 1 hour after beginning the anesthetic except in the case of chest surgery which was 1 1/2 hours.

The lowest blood pressure was likewise recorded and timed. It occurred 2 1/2 to 3 hours after starting and was 90 to 100 over 55 to 65 except for brain cases which ran 76 over 52. It is remarkable that all types of cases had their low points at about the same time.

The systolic blood pressures taken just before leaving the operating room were 92 for brains, 118 for gastrectomies, and 100 to 110 for the other types. Diastolic figures were 62 to 69. Blood pressure on arrival at the patient's room was essentially the same as the last pressure taken in the operating room. This to some extent denies the contention that there is a sudden drop in pressure seen on the floor when the patient returns from surgery. However, there is usually a drop sometime within an hour after the patient comes back.

The highest blood pressure in the first hour is 110 for brain cases and 124 to 130 for other types, with a diastolic pressure of 66 to 76.

(Table 4)

Table 4

Room Blood Pressure

	<u>First</u>		<u>High</u>		<u>Low</u>		<u>1 Hour</u>	
	S	D	S	D	S	D	S	D
Brain	99	59	110	66	78	49	88	56
Other Neurosurgery	109	68	130	76	103	61	128	66
Chest	103	67	124	73	94	53	109	69
Gastrectomies	113	71	128	76	106	68	118	73
Other Gastrointestinal	109	65	127	74	103	65	114	70
Miscellaneous	110	65	124	72	106	63	116	73

The lowest pressure is 78 for brains, 94 for chest, and 103 to 106 for all others over 49 for brains, 53 for chest, and 61 to 68 for all others.

The pressure at the end of the first hour shows an improvement in all types of cases over the lowest pressure in the room, and in all types of cases except brain it is equal or better than the last pressure taken in the operating room. They range from 88 for brains to 109 to 128 for others over 56 for brains to 66 to 73 for others.

There were 34 pulmonary complications or 7% of all cases. Of these 9 cases, or 2% died and 25 cases, or 5% recovered. There were 54 deaths from non-pulmonary complications or 12%. These pulmonary

complications consisted of 35% broncho-pneumonia, 26% atelectasis, 6% pneumonitis, 6% pulmonary edema, 9% pneumonia, 12% pulmonary emboli, and 6% miscellaneous complications.

Atelectasis is becoming more and more prominent in our conception of postoperative pulmonary complications and this figure of 35% is probably still too small. We try to minimize the incidence of atelectasis which may be promoted by an anesthetic by the use of helium at the end of the operation, also by removing any secretions which may have collected in the tracheobronchial tree. This is done by a suction catheter through the tracheal tube. Bronchoscopy is at times necessary. Thorough cleaning of

the mouth and pharynx by suction is essential. The lungs are hyperventilated with 50% helium and oxygen. The helium is not absorbed rapidly and tends to keep the alveoli open as does the nitrogen of the air. This of course will not prevent the decrease in respiratory effort due to postoperative pain and other factors tending to atelectasis and pneumonia.

As to the fluids given during operation, some interesting facts came out. For instance the gastrectomies and other gastrointestinal cases were practically the only ones getting glucose. Only 3 brain cases, no other neurosurgery, one chest and 2 miscellaneous cases received glucose. Practically everyone was given physiological saline but comparatively few received plasma except gastrectomies and other gastrointestinal. (Table 5)

Table 5

Fluids

	<u>Saline</u>	<u>Glucose</u>	<u>Blood</u>	<u>Plasma</u>	<u>Total</u>
Brain	706	17	667	25	1415
Other Neurosurgery	401	0	140	77	618
Chest	490	33	564	216	1303
Gastrectomies	617	527	310	283	1737
Other Gastrointestinal	434	137	410	197	1178
Miscellaneous	241	20	308	60	629

Brain cases averaged 706 cc. saline + 17 cc. glucose, + 667 cc. blood + 25 cc. plasma, a total of 1415 cc. Other neuro-cases averaged 401 cc. saline + 0 cc. glucose + 140 cc. blood + 77 cc. plasma, a total of 618 cc. Chest cases received 490 cc. saline + 33 cc. glucose + 504 cc. blood + 216 cc. plasma, a total of 1303 cc. Gastrectomies received 617 cc. saline + 527 cc. glucose + 310 cc. blood + 283 cc. plasma, a total of 1737 cc. Other gastrointestinal 434 cc. saline + 137 cc. glucose + 410 cc. blood + 197 cc. plasma, a total of 1178. Miscellaneous cases received 241 cc. saline + 20 cc. glucose + 308 cc. blood + 60 cc. plasma, a total of 629 cc.

rather light: morphine sulphate gr. 1/6, hyoscine hydrobromide gr. 1/200, one hour preoperative. This is somewhat different from the average premedication in this series but is the amount which we now prefer.

The use of cyclopropane has many advantages but probably the best feature is the high oxygen percentage available which is desirable in all patients and essential in some. The use of controlled respiration is another important factor. It maintains an adequate exchange of gases, removes the effort of breathing, thus aiding both surgeon and patient and allows the anesthetist to maintain a lighter plane of anesthesia with an adequate degree of relaxation.

Apparently there has been ample use of fluids of all kinds. Without doubt this is responsible for the favorable picture of the blood pressure which is presented. The prophylactic and immediate use of fluids to support the patients' vascular system is of extreme importance.

We are now using spinal anesthesia in conjunction with the cyclopropane on many of the abdominal cases and the results are very promising. We hope to be able to improve our patients with this newer technique.

Other factors which we feel are important are premedication, the selection of the anesthetic agent and method of administration. The usual premedication is

I wish to thank Drs. Brown, Merendino, and Leenhuis for their assistance. Also Miss Lemke, Miss McCormick, Mrs. Matthews, Miss Zespy, Miss Ritchie, and Miss Kelliher for their assistance in compiling this data.

VIII. GOSSIP

As spring quarter draws to a close there is evidence of relief for all, including students and faculty. There is something about the end of the year which creates a different impression than the close of any other quarter. This year on the accelerated program the train is going to turn around and start right out again. The freshman hours are from 7:00 a.m. to 5 p.m. daily except Friday when they finish at noon. There are intermissions during the day and no class on Saturday...The new directory for medical specialists for 1942 is off the press. During the past 3 years the volume has grown several inches in thickness. It would appear that future editions would have to be limited to supplements. The requirements of the various boards are listed. At first the regulations included acceptance of those in the field. When this small matter was taken care of the requirements standards jumped to dizzy heights. Without making an actual count it appears Minnesota's strength in internal medicine is outstanding. Internal medicine is the basic specialty to all the others. Visitors to our hospital universally commend the plan of having patients admitted through internal medicine to the various specialties....We have a distinguished group of visitors at the Center this week. They are here to study the Kenny Method of Treatment of Acute Poliomyelitis. While many represent clinical branches, there is a good representation from the fields of virus research and epidemiology. Because of the interest in this disease at the University of Minnesota it has been suggested we prepare a program for a group representing all related scientific activities, pertaining to the disease. ...Dean Diehl, who recently returned from a trip (this is not news), visited the General Hospital in camp in Oklahoma (this is news). He reports the staff in the pink of condition and much interested in their new life. While there he witnessed a review of the entire group and remarked that he found it difficult to recognize the new soldiers as our former staff members. A lay visitor at staff meeting one day remarked that he had never seen such sickly looking people as the doctors on the staff and wondered how we were able to

tell patients from physicians. This has been told on neuropsychiatrists for some time, but so far as I know this is the first time it has been applied to a general staff. There are many rumors these days of the activities of the assignment and procurement boards in regard to certification. All of us over 45 serve no useful purpose and clutter up the mails with demands for immediate service. The main emphasis these days is on the group 36 years and under. To assist these men in preparation for what appears to be a rather good possibility of service connection an invitation will be extended to them to attend the course in war medicine. ...The Minnesota State Defense group is making splendid progress. The reason for the sudden appearance of uniforms in the beginning of each week is occasioned by the drill periods at that time. Major Amberg draws many ohs and ahs as he struts in his regalia. Some of the nurses have gone to Camp Ripley while others are on local assignments. The serum center is now a member of this unit and no further orders for group processing of blood for other institutions are being received. The tire situation is coming close to home. Most of us find it difficult to imagine that we will be given any preference in it....The Minnesota State Medical Association will meet in Duluth at the new armory on Monday, Tuesday, June 29 and 30, and Wednesday, July 1. An excellent program has been arranged and the exhibits will be above average. It is the first time we have had an opportunity to go to Duluth since their new facilities have been arranged. It will be an excellent chance for many to get away who might not find it possible to do so with the regularity they enjoyed in other summers. The Duluth profession is always the good host and need I say more....Commencement time is now about over throughout the state and again I am impressed with the place of the general practitioner in the small community. A recent trip to Hendricks, Minnesota and a pleasant day with Pete Hermanson again brought this home. President of the school board, moving spirit in local hospital, active in civic affairs, a lovely home, splendidly equipped office and all modern diagnostic facilities. An equally entertaining visit to Rudie Ripple in New London, also active in school and community affairs...