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University of Minnesota

Roentgenologic Aspects of Bronchial Asthma

Volume XI | Friday, November 24, 1939 | Number 8

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William A. O'Brien, M.D.

I. LAST WEEK

Date: November 17, 1939

Place: Recreation Room
Powell Hall

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

Program: Movie: "Ferdinand the Bull"

Acute Respiratory Infections
C. A. McKinlay
D. W. Cowan
R. E. Carlson
P. A. Swenson

Discussion
L. G. Rigler
H. S. Diehl
C. E. Lyght
Gaylord Anderson
Ruth Boynton
C. J. Watson
B. A. Watson
C. A. McKinlay

Present: 148

Gertrude Gunn
Record Librarian

- - - -

II. MOVIE

Title: "Ugly Duckling"

Released by: R-K-O

- - -

III. ANNOUNCEMENTS

1. NEXT WEEK - Annual Staff Meeting Party

"Movies"

2. MORE LETTERS

"Enjoyed my brief stop at the University Hospital. Need the bulletin in part for improvement of my mind but mostly for the gossip.

Sincerely,
Paul W. Bancroft, M.D.,
Lincoln, Nebr.

Kindly place my name on your mailing list for the University of Minnesota Hospitals Staff Bulletins. I am with the CCC camp here until my Minnesota license is endorsed by the Texas Board of Medical Examiners. The climate is warm here, and the tall pine forests remind me of the Brainerd area in Minnesota. Visited Dr. Bond and his family in Jacksonville, Texas. His work with the Travis Clinic there keeps him very busy. I plan to open up a practice in the spring in central or southwestern Texas rather than near the Louisiana border where I am now.

Sincerely yours,
Theodore S. Wittels, M.D.,
Newton, Texas.

I wouldn't be without them.

R. D. Chier,
Los Angeles, Calif.

Katie and I both enjoy keeping in touch with the University Hospitals through this medium.

Respectfully,
O. P. Jones,
Buffalo, N. Y.

We appreciate these bulletins and "thank you."

Record Librarian-
St. Cloud Hospital,
St. Cloud, Minn.

Thanks and congratulations. We greatly appreciate these reports. Good wishes to you all.

E. L. Tuohy,
Duluth Clinic, Duluth,Minn.

Thanks. I do enjoy the Bulletins very much.

Theo. W. Stransky, M.D.,
Owatonna, Minn.

Please leave our name on your mailing list for the Bulletin: Both the staff members and myself enjoy the contents very much, and derive much benefit from the reports of the meetings.

Sister M. Cornelia,
Record Librarian,
St. Francis Hospital,
Breckenridge, Minn.

IV. ROENTGENOLOGIC INVESTIGATIONS IN BRONCHIAL ASTHMA

C. P. Truog

The term "asthma" has been used very loosely to cover a multitude of ailments. A great number of dysfunctions, such as arteriosclerosis, hypertension, pulmonary sclerosis, cardiac decompensation and others, can produce an asthmatic syndrome. Some authors consider the term "asthma" a symptomatic diagnosis, contending that it is merely a description of a symptom complex, which may be produced by many diseases. Most authorities, however, believe that the term bronchial asthma signifies a definite clinical symdrome, definite physical findings, constant pathological findings, and a fairly constant roentgenological picture. An attack of allergic asthma is assumed to be produced by one or more of the following: (1) spasm of the bronchial muscles, (2) edema of the mucosa, and (3) bronchial occlusion due to increased mucous gland secretion. The theory of bronchospasm finds support in the following facts: anaphylactic shock causes death in guinea pigs by bronchial constriction; the asthmatic attack has a sudden onset; hypertrophy of bronchial musculature has been found in asthmatics.

The edema theory is on less firm ground and is based on the fact that hyperemia of the bronchial mucosa has been observed through the bronchoscope during an asthmatic attack, that all allergic nasal mucosa becomes edematous when in contact with pollens and that angioneurotic edema and bronchial asthma are frequently associated with each other.

The observations which favor plugging of the bronchi by excessive mucus include the following: most of the small and medium bronchi are completely occluded in the asthmatics who die during an attack; bronchoscopic examinations reveal large collections of mucus in the bronchi during a paroxysm; mucus plugs are coughed up by a patient with relief of symptoms. The theory that mucous plugs in the bronchi, probably play the most important role in an asthmatic paroxysm, has recently been promulgated.[3,4,19,49]

The idea of bronchial spasm connected with bronchial asthma originated with Biermer[20] in 1870. According to his theory, in the asthmatic attack, there was an indirect stimulation of the vagi, which produced a spasm of the bronchioles, a distention of the alveoli, with a resulting pulmonary emphysema. Figley[19] believes that the asthmatic patient first has the atopic, i.e., extrinsic, type of asthma and that this is common to all cases of bronchial asthma. The attacks are at first seasonal, but later a superimposed bacterial infection develops upon the already edematous mucous membrane. The patient then has attacks at any time throughout the year, frequently associated with an upper respiratory infection; finally, the asthma becomes intractable.

Feinberg has reviewed the literature from the clinical side of bronchial asthma and hay fever, both for the years 1934-35[17] and for 1936[18], while Kern[37] has discussed the differential diagnosis and tabulates errors made in diagnosis and treatment.

Theories of today, which are formulated to explain the paroxysmal types of dyspnea, are all in agreement that the dyspnea is due to a stenosis of the bronchi or bronchioles. There is, however, considerable controversy as to just how this stenosis is brought about. Some contend that the stenosis of the bronchi is brought about entirely by a spasm of the bronchial musculature[58]; others contend that the stenosis of the bronchi is due to a hyperemia or a congestion of the mucous membranes of the bronchi with a resultant formation of mucous plugs[49]; while still a third group contends that both of the above factors play an important part in the paroxysmal attacks of dyspnea.

Bronchography

Roentgenography is the most important method of studying diseases of the chest, but in its original use it had its limitations. The introduction of a safe and

practical contrast medium was of the utmost importance.[29,30] Considerable use had been made of opaque media in roentgenology by various individuals,[24,9,47,35,23,10] but very little investigation of any significance had been done on the bronchi until Sicard and Forestier[54] prepared lipiodol. This substance is a poppy seed oil containing 40% iodine. It is not a solution but is a definite chemical compound in which the halogen ion cannot be detected by ordinary reactives. The credit for the introduction of lipiodol goes to Sicard and Forestier, but the credit for demonstrating its value in broncho-pulmonary infections is placed with Sergent and Cottenot,[51,52,53] who published their results in 1922 and 1923.

The numerous investigations in both the experimental and clinical field indicated that an opaque medium had been produced which was relatively free from danger if used intelligently. This was a great boon to the roentgenologists in the diagnosis of chest conditions, especially those conditions related to bronchi. It made possible the diagnosis of the type and site of the lesions, so exactly that a definite procedure could be carried out in the course of conservative medical management or in the use of more radical surgical methods.

Various means of administering the lipiodol for bronchography have been presented by many authors, each using a method or methods which he considered the most favorable. In general, however, there are but six main procedures of any significance. These are as follows:

(1) Direct laryngoscopic[1]
(2) Direct bronchoscopic[7,34]
(3) Cricc-thyroid route[13,5,6,27,51]
(4) Paranasal route[21]
(5) Intratracheal catheter method[1,8,26,44,42,3,4]
(6) Passive method[25,47,49]

The exact technique of any of these methods has been related repeatedly in the literature with very little variation. We will describe very briefly the passive method which we have used on our patients. This method is satisfactory in about 90% of the cases, when information concerning the middle and lower lobes is desired. The patient was given 1½ grs. of nembutal orally 30 minutes before beginning local anesthesia. This was used to reduce the chances of a cocaine reaction. The pharynx was then anesthetized with 10% cocaine hydrochloride. When satisfactory anesthesia had occurred the tongue was pulled forward and the lipiodol dropped slowly on the base of the tongue and allowed to flow into the larynx and trachea. Under fluoroscopic control, the desired side was filled by gravity influenced by the position of the patient. Roentgenograms of the chest were made 30 minutes later, usually a posterior-anterior and a right and left oblique view. If for some reason the above method failed the examination was then carried out under bronchoscopic control.

It is apparent from the previous discussion that in lipiodol we have at our disposal an opaque medium by means of which we are able to study the bronchi and their ramifications in detail and, if properly used, with comparative safety. There are nevertheless disadvantages and dangers which should be considered. Iodism of a mild degree has not been an uncommon experience. This usually results from absorption in the gastrointestinal tract secondary to swallowing the iodized oil. The symptoms usually appear within 24 hours following the injection of the oil. Another disadvantage occurs when the lipiodol enters the alveoli and interferes with the interpretation of subsequent roentgenograms. Ballon[11] found that coughing is an important factor in forcing the oil into the alveoli.

The chief dangers connected with the use of lipiodol to outline the bronchial tree are four in number, (1) possible dissemination of a disease already present in the lungs, (2) mechanical or physiological disturbance of the cardio-respiratory function, (3) injection of the lipiodol into the soft tissues of the neck, i.e. Crico-thyroid method, and (4) death, resulting immediately or in 24 to 48 hours after the injection, apparently explained on an allergic basis.

Amberson and Riggens[2] report a case of pulmonary tuberculosis with rapid spread of the disease following the use of lipio-

dol in the bronchial tree. Burrell[13] and his associates and Schneider and Segal[50] also report that lipiodol caused extension of the disease in their cases of active tuberculosis.

In patients, already markedly dyspneic, and having a low vital capacity, lipiodol should not be used, for it may further embarrass respiration and produce death.

Sudden death or death within 48 hours may occur. We have had experience with two such cases. One patient developed a reaction immediately after the introduction of the lipiodol and died 24 hours later. The fatality was apparently due to local allergy which caused edema of the lungs. The other case became very dyspneic following the injection of the oil and died within 48 hours. Postmortem examination revealed bronchopneumonia. This patient was apparently suffering from bronchopneumonia at the time of the examination, and the lipiodol probably precipitated a very severe infection from which the patient died.

Occasionally, a "drowned" lung may be produced in doing a bronchogram. This term is used to designate the extension of the lipiodol into the alveoli; this results in the production of a dense shadow in the roentgenogram which may simulate a lung abscess, but is usually fairly well recognized.[46]

We have seen from the previous discussion that lipiodol is not without its dangers, but that the advantages derived from its use offset any disadvantages and that it is absolutely essential for obtaining accurate information relative to the diseases of the bronchi and the lungs.

Bronchial Stenosis

Bronchial stenosis is very closely related to bronchial asthma and probably plays the most important role in the production of an asthmatic attack. Eloesser[16] listed the causes of bronchial stenosis as being, (1) congenital, (2) extrinsic, and (3) intrinsic. Stevens and Hudson[56] also discuss bronchial occlusion. Lichtheim,[41] in 1879, studied atelectasis by plugging the bronchi of rabbits with laminaria tents and observed massive collapse of the lungs with expansion of the contralateral side. Coryllos and Birnbaum[14] believed that bronchial obstruction is the only cause of atelectasis and that all other factors are but a predisposing cause. Galbraith and Steinberg, doing experimental work on dogs, found that the roentgenogram was positive for atelectasis in 24 hours. Abscess formation was present at the end of the fourth day, necrosis on the 13th day. Tucker[57] and others have shown that atelectasis can be demonstrated roentgenologically 4 to 6 hours after complete occlusion of a bronchus.

Jackson[36] described three types of bronchial obstruction: (1) stop valve, (2) by-pass valve, and (3) check valve. In the stop valve type of obstruction there is complete closure of the lumen so that air can neither get in nor out. In this type of obstruction the air within the alveoli becomes absorbed within several hours and atelectasis develops. If the block continues a "drowned" lung results and finally, necrosis and bronchiectasis with a destruction of the involved area occurs. In the by-pass valve type of obstruction the lumen is simply narrowed, and air can pass in or out but in diminished quantities. The lung peripheral to the obstruction will not fill out in inspiration as well as the remainder of the lung fields. Consequently, on the roentgenogram, there will be a wedge shaped area of slightly increased density.[59] The third type of intrinsic bronchial obstruction is the check valve type. Passage of air is normal during inspiration but is impeded during expiration. Thus, the alveoli will become distended and the blood is forced out of the capillaries due to the increased intra-alveolar pressure. This zone will appear on the roentgenogram as a wedge shaped area of increased radiability.

The check-valve type of obstruction simulates the type of bronchial occlusion present in bronchial asthma. Mucus plugs occur in the bronchi producing a partial obstruction. It has been shown by Huizinga[33] and Heinbecker[31] and others that bronchi dilate on inspiration and

contract in expiration. Thus, in bronchial asthma, the bronchi dilate in inspiration and allow air to pass by the mucus plugs, while in expiration, the bronchi contract about the obstruction and only a limited amount of air is able to leave the alveoli. Consequently, the alveoli become distended, the alveolar walls weaken and emphysema results. We have done experimental investigations on dogs, with paraffin casts which abundantly support this contention. We believe that this mechanism very closely resembles the mucous plugs in the bronchi in bronchial asthma.

Roentgenological Investigations on Patients Afflicted with Bronchial Asthma

Roentgenological investigations were carried out on 57 patients who had the typical history and physical findings of bronchial asthma; in all cases a definite clinical diagnosis of bronchial asthma had been made in the allergy clinic. These individuals had had asthmatic attacks for varying periods of time, ranging from $5\frac{1}{2}$ weeks to many years. When the patients first came to our department, a plain roentgenogram of the chest was made in order to determine whether any pulmonary emphysema was present. Bronchographic studies were then undertaken. The passive method, the technique of which has been described in a previous paragraph, was used almost entirely. Ten cubic centimeters of lipiodol, previously warmed, were injected into each lower lobe under fluoroscopic control. The patient was allowed to sit upright for 15 to 30 minutes after the injection in order to permit gravity to have its effect upon the iodized oil, before making the roentgenograms. Exposures were made in the posterior-anterior, lateral, and right oblique positions. In some patients, $\frac{1}{2}$ to 1 cc. of 1-1000 adrenaline chloride was injected subcutaneously, immediately following the first series of roentgenograms. These patients were allowed to wait one hour when another series of films were made. In other patients, no adrenaline was given, and they merely waited for an hour before making the second series of films. These procedures were carried out to see whether adrenaline had any real effect upon the advancement of the lipiodol or whether the most important factors in the extension of the oil into the smaller bronchi were time and gravity.

In all of the cases a careful study of the bronchial tree, as exhibited on the bronchogram was made. The purpose of this was to determine whether a diagnosis of bronchial asthma could be made from the bronchogram, i.e. whether or not bronchial asthma gives a characteristic picture.[49,3,4]

After a study of the bronchograms of the 57 patients and a study of the clinical histories, autopsy reports and microscopic slides of 41 patients, classified in the Pathology Department of the University of Minnesota, as bronchial asthma, we concluded that bronchial asthma does present fairly characteristic roentgenological findings if bronchography is utilized.

The most characteristic manifestation in the bronchogram is a narrowing and occlusion of the lumina of the bronchi. The narrowing was represented by a diminution of the width of the lipiodol column in the lumen. This was considered to be an early change and was present in patients with less severe attacks. the bronchial occlusion was demonstrated by a convex distal border of the column of lipiodol, giving a characteristic "snub-nosed" appearance. Some of the distal borders had a straight margin. A cylindrical dilatation of the bronchi with a fairly marked degree of occlusion was noted in patients with severe asthmatic attacks. The severity of the attacks rather than the duration of the disease appeared to govern the amount of occlusion and dilatation present. Those with less severe attacks showed a narrowing of the bronchi, while those with more severe attacks showed occlusion and dilatation.

Pulmonary emphysema was present in 51 of the 57 patients or in 89%. The emphysema was demonstrated fluroscopically and in the roentgenograms by limited mobility and low position of the diaphragms, shallow costophrenic sinuses, increased radiability of the lung fields, increased bronchovascular markings and pleural blebs.

Fifty-two of the 57 patients were diagnosed as bronchial asthma, roentgenologically, either from a narrowing of the bronchial lumina or characteristic occlusion of the bronchi or both. In the remaining five, one was normal, one was unsatisfactory, two showed bronchiectasis, and one was a case of pulmonary tuberculosis.

Of the 52 cases diagnosed roentgenologically as bronchial asthma, 43 or 83% exhibited a definite occlusion of the bronchi with a characteristic appearance. Thirty-three or 63% exhibited narrowing of the bronchial lumina characteristic of the less severe asthmatics. Twenty-five or 48% showed both narrowing and occlusion of the bronchi.

Table I. Summary of 52 cases diagnosed both clinically and roentgenologically as bronchial asthma.

Bronchi	No. of Cases	Per Cent
occlusion	43	83
narrowing	33	63
both occlusion and narrowing	25	48
narrowing only	9	1.7

Pathology of Bronchial Asthma

The number of patients with bronchial asthma who die from this condition is not large. Huber and Koessler[32] in 1922, reported 15 cases from the literature and added 6 of their own. Steinberg and Figley[55] in 1928 collected from the literature 28 cases who had died of uncomplicated bronchial asthma. There have been some additional cases reported since that time, but the total number is still very small.

The true pathological picture of bronchial asthma is a definite one, but is difficult to obtain owing to superimposed infection. Numerous other changes which confuse the issue are present and should not be considered as a part of the disease. In studying such cases it is important to take sections containing bronchi from uninfected, as well as infected, areas of the lung in order to determine whether or not the patient has bronchial asthma. Autopsy findings in apparently uncomplicated cases have been reported by Rigler and Koucky[49], Rubert and Warner,[12] Fisher and Beck,[20] Wright,[60] Kountz and Alexander,[39] MacDonald,[43] Huber and Koessler,[32] Steinberg and Figley,[55] Harkavy,[28] Lamson and Butt,[40] Michael and Rowe[45] and Fowler.[22] We have received much valuable information in regard to the pathology of bronchial asthma from Dr. Rudolph Koucky.[38]

The most common finding among these investigators, as well as in our series of cases, was the presence of large quantities of mucus in the bronchi with the formation of mucus plugs. There was considerable disagreement in regard to the presence of hyperplasia of the bronchial mucosa and hypertrophy of the bronchial musculature. We feel that there is no real hyperplasia but rather a redundancy or an infolding of the mucosa which is the result of attempted extrusion of the mucus plugs.

We have not considered the presence of emphysema as specifically characteristic of bronchial asthma for there are other diseases which will produce it. Grossly, the lungs of a true asthmatic are voluminous, light and feathery. There are usually sub-pleural blebs present on the surfaces of the lungs. The pleural cavity is not obliterated, but there are as a rule adhesions to the chest wall.

On cut section the lungs are dry and pink and the majority of smaller bronchi are filled with a solid yellowish mucoid material. This can be grasped with a forceps and pulled out and represents a cast of the lumen of the bronchus. These plugs usually begin at the third bifurcation and extend distally. Mucous plugs in the bronchi are not seen in any other disease and are pathognomonic of bronchial asthma. The following outline gives a fairly accurate description of what we consider to be the histological findings

of this disease:

A. Characteristic findings

1. Mucous plugs in the bronchi
   a. Whorling
   b. Cells (eosinophils, epithelial, lymphocytes, polymorphonuclear)

2. Hyperplasia of the mucosa
   a. Enlarged goblet cells
   b. Massive amounts of mucus in the glands

3. Thick hyaline basement membrane

4. Eosinophils in submucosa

5. Thick prominent bronchial musculature

6. Emphysema

7. Patchy atelectasis may be present

B. Confusing findings

1. Chronic inflammation -- peribronchial

2. Fibrosis of the parenchyma of the lungs

A - 3, 4, and 5 are not constant and may or may not be present.

A - 6 and 7 occur with other diseases.

B - 1 and 2 may be superimposed on the characteristic picture of bronchial asthma so as to make the diagnosis very difficult or impossible. Superimposed infection may cause a sloughing of the mucus membrane, peribronchial fibrosis, edema, lymphangitis, and congestion of the blood vessels.

Patients who succumb directly to bronchial asthma probably die from right heart failure or "asphyxiation." A study of our autopsied cases convinces us that these two causes of death in bronchial asthma are more common than has been previously supposed.

Correlation of the roentgenological and pathological finding in bronchial asthma indicates that the occlusion of the bronchi, as shown in the bronchogram, is due to mucus plugs. These plugs actually produce only a partial occlusion; air can pass by the obstructions on inspiration, but the more viscid lipiodol is unable to do so. This has also been borne out by experimental work on animals. The occurrence of emphysema rather than atelectasis is thus elucidated.

We can conclude from the above that there is a fairly characteristic roentgenological picture in bronchial asthma which is in agreement with the pathological findings. These roentgen findings have been largely overlooked in the past. The differentiation from other diseases such as non-asthmatic emphysema, bronchiectasis, post-pneumonic lung fibrosis and obliterative bronchitis, however, is not always easy, and all available information, other than that pertaining to the roentgenological findings, may be necessary to make an accurate diagnosis. These other diseases, as a rule, do not present the above characteristic findings of bronchial asthma.

Conclusions

Bronchographic study of 52 cases of clinically diagnosed bronchial asthma indicates that there is a definite roentgenologic picture in this disease. This consists essentially of the demonstrations of a partial or complete occlusion of many of the bronchi.

Studies of the autopsy findings in 41 cases thought to have had bronchial asthma reveals a close correlation between the pathology of this disease and the roentgen findings. Microscopic sections indicate that the occlusions shown in the bronchograms are the result of mucous plugs probably associated with some spasm of the bronchial musculature.

It seems probable that the chief factor in the paroxysmal attack is the presence of these occluding plugs. Relief from attacks after the therapeutic introduc-

tion of iodized oil seems to be due to the extension of the plugs which are displaced by the heavier chemical. The development of emphysema is due to the partial obstruction of the bronchi which allows air to enter the alveoli freely but impedes its egress.

The validity of the roentgen diagnosis of bronchial asthma based upon the bronchographic findings is abundantly borne out by the microscopic appearance of the bronchi at autopsy and by animal experimentation.

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V. GOSSIP

The Psychiatric Clinic for Children of the University of Minnesota Hospitals invited its friends and well-wishers to dinner at the Minnesota Union, November 20, and nearly 300 responded. President Ford presided. The Medical School was represented on the program by Dean of Medical Sciences, Harold S. Diehl, Head Pediatrician Irvine McQuarrie, Assistant Clinic Director, Reynold A. Jensen, and Clinic Director, Eric Kent Clarke. Cooperating agencies were represented by Executive Secretary Ann Starks, Washburn Children's Home Society; Executive Secretary, Charles E. Dow, Children's Protective Society; and Departmental Head Opal Jacobs (guardianship); the Bureau of Child Welfare of the Social Security Board. The first birthday of the Clinic was observed October 10, in the quarters on the sixth floor of the Eustis Building. The clinic was developed last year to study and help children with psychiatric problems. It is supported by funds from the Stevens Avenue Home of Minneapolis and the Commonwealth Fund of New York. It is the first clinic of its kind to be established in connection with a Medical School and University Hospital. During the past year a similar arrangement has been developed at Stanford University. Growing pains characterized the earlier efforts to organize the service (few cases were accepted before November 15, 1938). Growing pains have still bothered the department physically, but relief is in sight, as a new unit is being constructed south of the play room to house certain staff members who have heretofore been separated from the group. The staff consists of a director and assistant director, two psychologists, three social workers, an executive assistant, three departmental secretaries, a volunteer school teacher, and a speech pathologist. The offices are compactly arranged with special provision for uninterrupted interviews. Those of us who are bothered by telephone calls (a most impolite method of breaking in on someone else's time) envy the group. This provision is also helpful in shortening the time necessary to get information as an interruption may spoil the entire interview. The group has studied 133 cases during the year. 86 have been closed and the balance have been carried forward. Each case is given the combined service of the team. Interviews which make up the yard-stick of service show interesting correlations. The psychiatrists and social workers had a record of 1044 and 1087 cases respectively, while psychologists had 704. In addition to these regular cases there were 34 hospital consultations and 110 psychometric studies on in and out patients. Many casual interviews corresponding to the informal consultations in general hospital practice are an interesting feature. A staff member from the Psychiatric Clinic calls on each pediatric patient every day (entire service). The time devoted to this function varies from a greeting to an interview. Careful check is made of the little patients' mental attitudes toward their problems. Visits to those who are not visibly disturbed enable the workers to get acquainted so that if trouble comes, it is a friend, not a stranger, who is there to help. Case conferences follow the rather well-established lines of cooperative effort elsewhere. There were 126 conferences on initial cases and 56 treatment conferences. In spite of the fact that the entire staff is working at top speed many of the 300 applications for service had to be rejected. The social agencies sent as many as the hospital, schools and parents bringing in the remaining. Every type of child problem has been seen, including delinquency, school failure, social maladjustment, and believe it or not, "baby and child neurotics" to use the common term. Life's difficult situations often find the young unprepared to meet them. The Clinic has reason to be proud of its program of education. Lectures to the medical students, public health nurses, psychologists, and educators, as well as lay lectures comprise the full program. In the field of investigation problems to be opened for study are enuresis, the fate of the premature, and the results of debilitating disease in the infants. Juvenile paresis has been investigated in cooperation with radiology and pediatrics. The psychologists are prying into "measurement of masculine-feminine

interests in children," "nature of the intelligence test performance of children who have had convulsions and other debilitating disease in infancy and early childhood," "the evidence of various symptoms attributed to clinic patients among children in the general population." The Clinic is also co-operating with the Services to Crippled Children and the Department of Pediatrics to devise a program for the crippled children. The new unit has reason to be proud of its first year. It has been the good neighbor to all of us including many outside agencies. It has brought to our group an interest in the psychiatric problems of children who are sick from other causes, .. as well as the mentally ill. It is providing opportunities for graduate instruction and in characteristic Minnesota fashion finds a place at its conference table for all who may be interested. The enthusiastic crowd which attended the dinner came away feeling that much good had already been accomplished. Looking toward the future from this very substantial start it is not difficult to predict that child psychiatry will be a permanent member of our group. (In the past such agencies often were removed when special support was no longer available.) Former members of our staff and old students returning to the University are surprised to note our psychiatric development for both the adult and the child on the top floor. To be consistent we should open up a podiatry service in the basement. At staff meeting December 8, adult neuropsychiatry will tell us of the many things they have learned about their patients (and ours) as the result of essentially the same arrangement in the field of adult problems as we have for children. Under the leadership of Dean Diehl, so many new projects have been developed that he must feel like the man who had to make a choice at operation of loss of memory or loss of vision. He sacrificed his memory as he thought he would rather see where he was going than remember where he had been....The Center for Continuation Study celebrated its third birthday November 13. The dedication ceremony program is interesting to review in light of subsequent development. Although many were called to speak and all were heard, none apparently knew what it was all about except the late President Lotus D. Coffman. The course of development instead of starting from his suggestions seems to have described an arc only to return to Dr. Coffman's original line of vision. "Wise" heads urged Dr. Coffman to limit the space in the building as it would probably not be used for a long time. Although room occupancy is not yet running up to capacity during all the months, there are now many months during the year when the building is inadequate to meet the needs of those who desire to use it....Another interesting new project at Minnesota is the Children's Dentistry Research Unit. This is a cooperative venture with the Department of Pediatrics and the Division of Biochemistry. The west end of the large operating clinic has been partitioned off for the out-patient service and new laboratories have been located on the first floor in charge of Dr. Wallace D. Armstrong. Children's dentistry is the hope of the future. In certain countries where socialized dentistry has already arrived, children's dentistry is the only variety included in the program. We believe in this country that socialization is not necessary for the success of a movement. Dr. Vern D. Irwin, who heads the dentistry section in the State Department of Health is spending his time and effort on education of the dentist and the public. Clinics and conferences throughout Minnesota follow a similar pattern to the program of maternal and infant welfare. Cavities repaired in childhood save expensive dental bills for adults. So little is known of the origin of caries (except the age relationship) that the dental research team will be busy for some time.....
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Happy Thanksgiving!

VI. REPORTS

UNIVERSITY OF MINNESOTA HOSPITALS
Average Stay in Days per Patient per Service

Service	July - October 1938	July - October 1939
Surgery, General	11.3	11.5
Urology	10.8	13.7
Tumor Urology	13.4	
Orthopedics	29.2	29.5
Neurosurgery	12.6	12.1
Tumor Surgery	5.2	7.3
Reconstruction Surgery	18.0	14.8
Tuberculosis Surgery	44.0	55.5
Chest Surgery	20.7	17.4
Medicine	16.9	19.0
Neurology	12.0	11.6
Dermatology	17.7	14.6
Tuberculosis Medicine	40.9	
Psychiatry	39.2	31.9
Ophthalmology	15.4	13.3
Otolaryngology	4.8	6.3
Gynecology	10.8	9.1
Tumor Gynecology	13.7	28.5
Obstetrics	13.2	11.5
Newborn Pediatrics	9.3	9.1
Surgery Pediatrics	12.0	13.3
Reconstruction Pediatrics	15.4	16.3
Orthopedic Pediatrics	31.2	32.3
Medical Pediatrics	8.9	8.1
Ophthalmology Pediatrics	12.0	12.8
Otolaryngology Pediatrics	5.9	6.1
Urology Pediatrics	13.1	10.3
Health Service	4.0	4.2
Ambulatory	3.0	.5
Patient Days	41,611	45,134
Patients Treated	2993	2952
Average Stay per Patient	13.8	15.2

UNIVERSITY OF MINNESOTA HOSPITALS

DEATHS AND AUTOPSIES BY SERVICE

Service	Jul.1'38-Oct.31'38		Jul.1'39-Oct.31'39	
	Deaths	Autopsies	Deaths	Autopsies
Surgery, General	26	17	43	40
Urology	10	7	16	9
Tumor Urology	1	0	0	0
Neurosurgery	6	5	4	2
Tumor Surgery	5	4	1	1
Tuberculosis Surgery	1	0	0	0
Chest Surgery	1	0	4	0
Medicine	50	34	49	37
Neurology	7	7	7	6
Dermatology	0	0	1	0
Psychiatry	4	0	2	0
Ophthalmology	1	1	1	0
Otolaryngology	1	1	2	1
Gynecology	4	2	3	3
Tumor Gynecology	2	2	3	2
Obstetrics	1	1	2	2
Pediatrics	42	25	50	29
TOTALS:	162	106	189	131
Percentage		65.5%		69.3%