CONCLUSION

I believe that far too little surgery is generally done in cases of infantile paralysis, and that nearly all cases can be benefited by properly planned and properly executed operations.

In a single paper of this length the subject can be only sketched lightly, and the intention has been to call attention to a few of the more useful operations which have stood the test of time and experience.

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ABSTRACT OF DISCUSSION

DR. E. A. RICH, Tacoma, Wash.: For the last few years I have been much interested in this line of work and wish to attest its efficacy. If judgment is used in the diagnosis of the pathology present and in the selection of the proper corrective procedure, and if the work indicated is skillfully performed, the condition of the limb should be bettered. In some patients not suffering extensive muscular losses, the restorations after wise surgical measures are often marvelous. While the leg cannot be made so large or so beautiful as the normal leg it is always possible to restore all or part of the function.

DR. F. J. GAENSLER, Milwaukee, Wis.: I was interested to hear Dr. Ryerson's frank report regarding his experience with neuroplasty. When abroad last summer, I paid particular attention to this procedure in infantile paralysis. Dr. Spitzzi of Graz operated on one patient while I was there, but unfortunately I saw none of his late results. Dr. Putti of Bologna said that Spitzzi had operated on three patients for Dr. Codivilla in Bologna, and that in none was there any improvement to be detected by careful examination at the end of two years. There seems to be a lack of interest in neuroplastic methods in recent years. I have had only a limited experience with silk ligatures for drop-foot, etc., but cases of this kind that I have had have been satisfactory. I used bichlorid silk. In one case the large knot caused a pressure sore on the outside of the tarsal bones. That granulated over, however, and gave no further trouble.

DR. ROLAND MEISENBACH, Buffalo, N. Y.: Dr. Ryerson's excellent work in this connection has brought many ideas to my mind. The use of silk has been well established for tying purposes. In employing the silk for the purpose of substituting tendons or ligaments, we should consider carefully whether we have to deal with an actively growing epiphysis, as in children, or not. This does not hold good so much in drop-foot as in deformities in other parts of the body, for instance, the knee-joint. Implanting silk ligaments may be temporizing only.

Dr. Ryerson made the statement that silk remains indefinitely in the tissues. I cannot altogether agree with him in this regard. Several years ago I had occasion to make some experiments in regard to silk and catgut in tissue. The cross section showed that the catgut readily absorbed. It required for silk, however, a longer time. The first process was to bring to it many leukocytes, and then slow absorption took place. I can readily understand what becomes of the silk in cross section, but I should like to know Dr. Ryerson's theory in regard to the lengthening of these fibrous bands or ligaments, as the child grows older. Silk is unelastic, and I think that it makes little difference whether one uses braided or twisted silk. Lange, I think, uses braided silk. I have been employing silk substitutes for tendons in selected cases only, as I do not believe that it is the ideal method of procedure in many cases of infantile paralysis.

DR. NATHANIEL ALLISON, St. Louis: Dr. Meisenbach has brought up the question that interested me a great deal in doing this work; that is, the ultimate fate of these silk strands and ligaments. I undertook to find out primarily what took place by introducing silk strands into the tendon-sheaths of dogs. I had one animal that carried such a strand in his tendo Achillis sheath for five months. On section of that tendon, I found that the tendon-sheath had proliferated to a marked degree and that the silk was infiltrated with

cellular elements to a great extent. So it seems to me that this might answer, in a way, the question asked by Dr. Meisenbach concerning the fate of these ligaments. This was braided silk. If the process should go on and the silk become absorbed, it seems probable that a fibrous band would be left, which might be serviceable as a ligament. That is my idea, at least.

DR. EDWIN W. RYERSON, Chicago: I said that the silk apparently remains indefinitely in the tissues. That does not mean much, because I have only about five years to report on in my cases. In all of them that I have been able to trace, in which the operation took place five years ago, the silk is still there. There has been a marked increase in its size, which is, of course, due to the connective tissue forming around it. It has, so far, shown no signs of being absorbed.

Many operators use twisted silk instead of braided silk, but it is not so strong, compact or rigid. I have seen no specimens presented to show the actual absorption of the silk, and I do not believe that it will occur. I do, however, believe that in some cases the silk may be worn through after a time; but you have seen the picture of the woman in whom it has been in place for two years, with a great deal of strain on it. In this case, four large No. 16 cords were used, and they are apparently still there.

I think that Dr. Meisenbach wanted to know what happens when the leg grows and the silk does not. Of course, the silk does not change its length, and I have been interested in speculating on the ultimate result in such cases. As you know, the majority of growth in the tibia—three-fourths of it—takes place at the upper end. I do not place the silk much above the lower epiphysis, where only one-fourth of the growth occurs. The growth would be likely to cock the foot up in the air, but this has not as yet happened in any of my cases. In some cases in which periosteal implantation was done, the foot has dropped down on account of periosteal stretching. If the silk ligaments should become too short, one might do a tenotomy and lengthen them, or put in a lengthening piece of silk.

If the subcutaneous tissues are sewed thickly over the site of the knots, they will seldom give any trouble. Of several hundred cases, I have had the silk give trouble in but three. In two of these, the silk came out. This was due to a stitch-abscess. In the other, there was a deep abscess and a small piece of silk came out. These were tendon transplantation cases. In only one case has a silk ligament given any trouble.

ACIDOSIS AS A COMPLICATION AFTER
SURGICAL OPERATIONS *

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No length of training in surgical technic, no amount of experience in the operating-room, can make a competent surgeon of any man who is poorly equipped in the theory and practice of general medicine. The practitioner of surgery who loses interest in the problems of internal medicine becomes in time but little better than an overrated and overpaid mechanic plus a deficient surgical judgment and minus a surgical conscience; yet many of our surgeons of great note and most of the lesser lights struggling for recognition actually boast of their ignorance of, and lack of interest in, any branch of medicine outside the immediate scope of their special work.

It is small wonder, then, that the men engaged in other lines of work, particularly the neurologists, complain that most of the so-called neurasthenic patients they are called on to treat present abdomens decorated with scars marking the sites of operations that have

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made worse the conditions they were designed to relieve. Unwarranted operations, with the resulting cost in suffering and heart-breaking disappointment and the discredit cast on the profession, are bad enough, but there is yet another and a graver indictment against the surgeon who through ignorance or carelessness fails to study his patients before taking them to the operating-table. I refer to his failure to recognize in a large percentage of chronic cases certain symptoms that bear no close relationship to the conditions for which he proposes to operate, but are veritable danger-signals warning him of the existence of some more or less grave constitutional state, some serious disturbance of metabolism, which for the time at least renders the patient an extra hazardous risk for a general anesthetic, and yet with proper attention may be cleared up and a serious danger averted.

The handling of a surgical case may arbitrarily be divided into:

1. The examination and diagnosis.
2. Preparation for the operation.
3. The operation.
4. The postoperative care.

The examination and diagnosis, requiring in many cases by far the greatest amount of learning and skill, are often treated in a perfunctory way. The case not infrequently comes into the surgeon's hands with the diagnosis already made and the operation planned by the family physician, who may or may not be a competent man. The surgeon too often accepts this diagnosis almost without question and merely confirms it with a few leading questions covering history of the local condition for which operation is proposed, and then after a limited physical examination and a partial urinalysis to determine the specific gravity and the presence or absence of albumin and sugar, directs that the patient be given the "usual preparation for operation," meaning the routine in vogue at the hospital and applicable to all cases without special reference to the peculiar needs of any one case.

The operation receives the only serious attention given by the surgeon himself, and fortunately the modern hospital technic and skilled assistants and nurses render this work safe as far as infection, hemorrhage and shock under ordinary circumstances are concerned. The hospital routine and skilled nursing furnishes all the after-care needed for ordinary cases. In any event, it is all that the patients are likely to receive. If at the operation the diagnosis is found to be correct, and, the patient's condition is in other respects satisfactory, the result will, of course, be all that could be desired. If, however, an innocent appendix has been removed, a harmless gall-bladder drained, a gastro-enterostomy done for chronic reflex pyloric spasm, or an unoffending uterus or a harmless movable kidney fixed in a position that will give rise to real symptoms instead of imaginary ones, as before the operation, surgery has merely been discredited once more, and the patient and the patient's friends disappointed and subjected to needless expense and heartaches.

This certainly is not to be desired and the surgeon deserves the censure of all right-minded persons. If he deserves censure for his carelessness in failing to exhaust every available means to arrive at a correct diagnosis before subjecting the patient to the fearful ordeal of a surgical operation, what are we to say of his failure to note in his patient's history and present condition a symptom-complex which could not possibly be accounted for by the local conditions, which clearly points to some

perverted state of metabolism, and may constitute a serious menace to the chances for an early recovery, if not, indeed, a danger to life? Suppose, for example, that the patient has been starved by an improperly balanced diet, deficient in carbohydrates and consisting chiefly of proteins; has been starved and exhausted by prolonged diarrhea or vomiting, or has been a victim of so-called food terror in which he or she voluntarily refrains from taking proper food in sufficient amounts; or suppose that the patient is suffering from some toxemia, the result, perhaps, of chronic intestinal indigestion with constipation; the prolonged ingestion of some poison such as alcohol or tobacco, or drugs such as the salicylates, or is the victim of a toxemia resulting from some obscure organic disease as of the liver, pancreas or kidneys. The patient, let us say, is a young woman seeking relief for a chronic appendicitis. Suppose we confirm the diagnosis and advise operation, but fail to note that:

1. She has an abnormal dread of the operation and seems terror-stricken to an unusual and unaccountable degree.
2. She suffers from tachycardia and a tendency to dyspnea.
3. She complains of frequent headaches, vertigo and great mental depression.
4. Her breath has a peculiar sweetish odor, suggesting the odor of rotten apples.
5. Her extreme and peculiar nervousness has been sufficient to cause her family some anxiety as to her mental state.
6. The patient's urine is loaded with acetone, and therefore perhaps also with diacetic acid and beta-oxybutyric acid.

Failing to be warned, the surgeon allows this patient to go to the operating-table after the usual routine hospital preparation. The following account of what happens is familiar to us all.

1. The patient resists the anesthetic after the manner common only in such cases, and in alcoholics.
2. She vomits incessantly and the nausea persists for several days.
3. The pulse becomes rapid and often irregular.
4. She remains drowsy and stupid for an unusually long time after the anesthetic is withdrawn.
5. Her temperature may shoot up without apparent cause.
6. She is nervous and restless and suffers intensely, but does not tolerate an opiate well.
7. After a prolonged and anxiously watched convalescence the patient finally recovers.

This is the usual history, but some of these patients are not so fortunate. All the symptoms are much exaggerated. The patient does not completely regain consciousness, but after ten or twenty hours of persistent vomiting, rapid and irregular heart-action, a rising temperature, wild delirium or a more or less profound stupor, she dies.

A very little knowledge of internal medicine places us in possession of the following all-important facts:

1. These patients are the victims of some perversion of metabolism, associated with diminished alkalinity of the blood and the appearance in the urine of the acetone bodies.
2. They do not tolerate any general anesthetic, and most of them do not even tolerate opium or any other narcotic drug.
3. Large quantities of water, preferably carbonated, a diet of starches and sugars, preferably 5 or 6 ounces

of oatmeal with lactose daily, with alkaline laxatives and sufficient alkalis, such as sodium citrate or bicarbonate, to keep the urine neutral for four or five days, and frequent warm baths with friction of the skin will cause most or all of the symptoms to disappear in an astonishingly short time.

4. The condition will recur to some extent on very slight provocation, particularly after a general anesthetic, but can usually be forestalled by the use of alkalis and water by the mouth, by the bowel, or, in extreme cases, in a vein.

The significance of the acetone bodies in the urine has long been a matter of debate. It was at first thought that they were derived from glucose because of their appearance in diabetes. Then the origin was at a later date ascribed to the proteins, but according to A. R. Short of Bristol University, who has recently summed up all the available evidence, it is now definitely established that they are the result of a peculiar abnormal breaking down of fats. The physiologic process of dealing with fat is to resolve it into carbon dioxide and water with the liberation of heat; but when for any reason the tissues are unable to obtain sugar from the blood, fat is broken down with the production first of beta-oxybutyric acid, then diacetic acid and finally acetone. The relative amounts of these acids are dependent on the rapidity with which the breaking down of fats occurs. R. C. Cabot says that the appearance of the acetone bodies is due to a diminished utilization of carbohydrates because (a) sufficient carbohydrates are not ingested, (b) the sugar is not absorbed, or (c) the sugar is not assimilated.

The rôle played by the liver is not clearly understood, and it has not been demonstrated according to some authorities whether the fatty degeneration found in the liver, kidneys and other organs after death in these cases is the cause or the result of the acidosis. Apparently the acetone bodies are not in themselves poisons except in enormous doses. It would seem that the evil done is not due to any particular acid but rather to the reduction in the alkalinity of the blood. In the condition of abnormal catabolism of fats with the production of the beta-oxybutyric acid, diacetic acid and acetone, the body first relies on the reserves of sodium and potassium, but chiefly on the large quantities of ammonia, the result of the normal metabolism of the proteins. The ammonia combines with the beta-oxybutyric and diacetic acids and does not become converted into urea by the liver. Finally the supply of ammonia fails and the alkalinity of the blood falls, and a fatal termination results unless something is done at once to restore, at least in part, the normal reaction.

After all, we are not concerned with the many theories seeking to account for the appearance of the acetone bodies in the urine; but the fact that their appearance does indicate a serious perversion of the patient's metabolism and strongly contra-indicates the administration of a general anesthetic, until by appropriate treatment the patient becomes able to tolerate the anesthetic and to stand the operation, is of the greatest importance.

Every surgeon, of course, knows that certain nervous symptoms, such as abnormal fear of an operation, headache, a rapid pulse and a tendency to nausea usually indicate that the patient will not tolerate the anesthetic well and will probably suffer much from nausea and vomiting, restlessness and an unaccountable rise in temperature during the convalescence. My attention was first directed to the possibility of a fatal issue in exag-

gerated cases of this type about six years ago, when called in the following case:

CASE 1.—A boy, aged 16, had been operated on three years previously for chronic appendicitis. He had suffered much from headaches, extreme nervousness and fear of the operation. The anesthetic given was chloroform. During the anesthesia his excitement was extreme and he had to be held on the table. He failed to react promptly and remained in a semistupor, with a rapid, irregular pulse and persistent nausea and vomiting. A specimen of urine removed by catheter contained some albumin, and casts and was extremely acid in reaction. (No test was made for the acetone bodies.) In spite of the odor of the anesthetic this boy's breath had the peculiar sweetish rotten-apple odor characteristic of acetone-mia. His condition went from bad to worse and at the end of eighteen hours he died. At the time I did not recognize the nature of the trouble.

CASE 2.—A year later a second case of the kind occurred. The patient, a nervous, so-called hysteric girl, aged 18, whose history showed that she had suffered much from vertigo and from persistent neuralgic headaches and from an irritable bladder, had also had an interval appendectomy. She had often had vomiting spells and had been told that she was a victim of the uric acid diathesis. She was constipated, but suffered from frequent attacks of diarrhea. The urine before the operation did not contain albumin or sugar, but was very acid.

The anesthetic in this case was ether and a large amount had to be administered because of the difficulty in keeping the patient relaxed. She left the table with a rapid, thready pulse, persistent vomiting and dyspnea. In a few hours her temperature had reached 104 by rectum. The urine was heavily charged with acetone, and the odor could be easily detected on the breath. The urine also contained albumin and casts. She died in twelve hours.

CASE 3.—A woman aged 24, with a history of chronic colitis and periods of obstinate constipation, with tenderness and gurgling in the right inguinal region, had been advised a year before to undergo operation for chronic appendicitis. Two weeks before the operation she consulted her family physician for relief from persistent headache, general muscular soreness, mental depression and occasional fainting spells. At the time the tongue was coated, the breath bad and the urine extremely acid and containing indican. Nitrous oxid and oxygen was the anesthetic and no ether at all was given. Once the anesthetic had to be withdrawn because of the danger of respiratory failure, and she never was completely relaxed. She failed to completely regain consciousness, and developed persistent vomiting, an intermittent, irregular and rapid pulse, marked dyspnea and a rapid rise in temperature to 105 in less than five hours after the operation. The breath was characteristic and unmistakable, and the urine, which was secreted at the rate of about 2 ounces per hour, was heavily charged with acetone, but no albumin or casts, and the specific gravity was low. She was given alkalis by the bowel and in a vein, but without avail. Death occurred in about twenty hours.

CASE 4.—Mrs. —, aged 38, above the average height, the sister of a well-known physician, sought relief for a large uterine fibroid which for about a year had caused a considerable loss of blood and much pain. For a number of weeks she had lived on an almost carbohydrate-free diet, a part of the time living on meat extract broths. During this time she had developed a chain of very distressing nervous symptoms, most prominent of which were vertigo attacks, great excitability, with a pronounced muscular tremor on slight exertion, and frequent headaches, with occasional attacks of persistent vomiting lasting as much as twenty-four hours. I saw her first in the afternoon preceding the day set for the operation, and on entering the room was immediately struck with the pronounced odor of acetone. The patient was propped up on pillows, saying that she could not get her breath easily when lying down. The pulse was rapid and she was much excited. She said that she had not slept any

on account of nervousness for three nights and felt a firm conviction that she would die. The urine examination showed an enormous amount of acetone, but no albumin or sugar. Operation was deferred, and the patient, under the care of Drs. D. M. Stone and B. F. Stout, was kept for a week on a diet of 6 ounces of oatmeal with milk, sugar and cream daily. She was made to drink large quantities of carbonated water, and had colon irrigations twice daily with an ounce to the quart of sodium bicarbonate and from 3 to 5 drams daily of sodium citrate by mouth. On the morning of the fourth day the patient stated that she had had her first restful night's sleep in six months, that her headaches and nervousness had entirely disappeared, and that she did not dread the operation any longer. She was now quite cheerful. The change in her condition was indeed remarkable. The pinched, anxious, haggard expression had disappeared and she seemed quiet and relaxed and rested. On this day there was but a trace of acetone, and the urine was alkaline in reaction. Three days later she was operated on, her pulse having been reduced in the meantime from 120 to 78 when at rest. Ether was given. She left the table in good condition, but at the end of six hours became restless, and began to vomit and to suffer from dyspnea. The urine again contained acetone and some albumin, with a few granular casts. The stomach was washed out with a strong sodium bicarbonate solution and she was placed on the Murphy drop with sodium bicarbonate solution, an ounce to a quart. In a few hours her condition was again normal. She made a good recovery, but three months later called at my office complaining again of headaches and nervousness, and confessed that she had failed to follow directions with reference to diet, etc. The alkalies, diet, warm bathing and alkaline irrigation soon restored her to normal.

CASE 5.—Miss E., a trained nurse, aged 26, gave a history of having had appendicitis when a child and having suffered from obstinate constipation, a coated tongue and flatulency and headaches ever since. During the past year she had had a number of attacks of intestinal colic, always accompanied with nausea and vomiting and great nervousness. Recently she had had several severe attacks of pain in the right side with rigidity, vomiting, extreme prostration and a fear of impending death. This girl had always been unwise in the selection of her diet. She drank very little water and her diet consisted chiefly of proteins. The urine contained indican and acetone and was very acid. She was prepared for the operation with a view to eliminating the danger of acetoneemia and stood the operation well, except that she resisted the anesthetic very much and could not be relaxed. In spite of our efforts she had four days and nights of intense suffering from pain, restlessness, vomiting dyspnea, headache and abdominal distention. The ascending colon had been stripped of a very extensive pericolic veil, but this could not account for the pain and distention. She finally recovered after a rather tedious convalescence, during which colon irrigations with a soda solution played a prominent part in the treatment.

I have collected the records of thirty-four cases, in which a fatal issue resulted in seven. The cases reported, however, are typical and I will not lengthen the paper by detailed reference to the others.

CONCLUSIONS

Because of a marked reduction in the normal alkalinity of the blood, the result of some perversion of metabolism, many of the patients requiring surgical operations are unfit subjects for general anesthesia and the ordeal of an operation. The warning signs in such cases are:

1. A history of unaccountable headaches, vertigo, attacks of dyspnea, occasional nausea or vomiting, an unreasonable dread of the operation, tachycardia and other nervous symptoms.

2. A peculiar sweetish odor to the breath, suggesting the odor of rotten apples. In some cases this is marked and unmistakable.

3. The presence in the urine of the acetone bodies.

To disregard these warning signs is to subject the patient at best to (1) an anesthesia requiring large amounts of ether or chloroform, and attended with struggling and great rigidity of the muscles, difficult breathing, a rapid pulse and nausea, followed by a prolonged and nerve-racking convalescence with persistent vomiting, restlessness, dyspnea, a rise in temperature and much suffering, or, if less fortunate, to (2) the certainty of a fatal termination, preceded by nausea, air-hunger, persistent vomiting, a rise in temperature, great nervousness, followed by coma and death in from ten hours to two or three days.

A recognition of acidosis in time followed by the institution of such measures as a carbohydrate diet of, say, from 6 to 8 ounces of oatmeal and cream with lactose, large quantities of carbonated alkaline water, colon flushings with an alkaline solution and the internal administration daily of 3 or 4 drams of sodium bicarbonate or sodium citrate by mouth will be followed by a rapid disappearance of all or most of the unfavorable symptoms, and the patient will be rendered for the time being at least a safe subject for the anesthetic and the operation.

Hicks Building.

VON MIKULICZ' DISEASE—FURTHER STUDIES

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Von Mikulicz' disease is a chronic, indolent, symmetric enlargement of one or more of the salivary or lacrimal glands, which is non-painful and which von Mikulicz could not classify under any of the diseases heretofore described. The first case of this nature was presented by von Mikulicz,¹ Jan. 23, 1888, before the Verein für wissenschaftliche Heilkunde at Königsberg. In 1894 von Mikulicz first described what he thought was a distinct and typical well-defined heretofore undescribed disease.

The following case is an example of his syndrome:

History.—M. B., a man, aged 22, feeder by occupation, was born in the United States of parents from Galicia, Austria, who have been married for thirty years and have ten children, all living and well with the exception of one who died from an infectious disease in childhood. Both parents are alive and enjoy perfect health. The patient, whom I saw March 4, 1912, does not drink or smoke; he is very nervous and consumes a great deal of coffee. At the age of 2 he became blind and remained so until 7 or 8 years old. Vision is poor now. At the age of 3 he had infected cervical lymph-nodes, which were lanced. He has always been troubled with nasal catarrh and cannot breathe through the nose. For the last four years he has been having a hemorrhage [from lung (?)] once a year. He has stomach trouble and is constipated. About five years ago he had skin disease associated with constant itching. For the last six years he has been ruptured. He has had discharge from the left ear for years. The patient had a soft chancre four years ago which healed without treatment; he has not taken any internal treatment; he never had gonorrhea. Three years ago he noticed a painless swelling appear over the right submaxillary region. About two years later the left submaxillary and the right parotid glands became enlarged.

¹. Von Mikulicz: Berl. klin. Wchnschr., 1888.