

the answers indicates that if the child has squinted since birth, or within a few months from that time, operation should be performed earlier than if the squint had developed later. Others advise waiting until various ages. A large majority of answers show that many do not believe in an approximate correction under general anesthesia, while some claim good results from this in certain cases, especially those of high degree, where other means have absolutely failed. When all means have failed, if the vision and field of rotation are good in each eye, especially if it is possible to develop fusion tendency by the amblyoscope, I think it advisable to obtain an early approximate correction under general anesthesia in order to assist the other factors in producing parallelism of the optic axes. It is well to be very careful not to overcorrect in cases of convergent squint.

In what percentage of your operative strabismic cases is binocular single vision obtained—extreme age limit, if any?

The percentages of success in obtaining binocular single vision vary greatly. Some claim to obtain it in scarcely any, others in a very large proportion of cases. The answers, as a whole, indicate that binocular single vision is often obtained. Several give an age limit from 8 to 10 to 15 years or older. Some cite instances where binocular single vision was obtained in adult life. Greenwood cites the case of a patient 20 years old; Würdemann one of 25; Wells one of 25; Hulen one of 39; Snyder one of 45, and Vail one of 50, each of whom recovered his binocular vision power. Several express the opinion that there is no age limit in these cases, and that binocular single vision might be obtained at any age. Many claimed that their recent increase of successes is the result of experience and the employment of better methods.

In what percentage of your cases do you use a general anesthetic?

A majority prefer the use of local anesthetics, except when advancements are to be performed on small or uncontrollable children or very nervous adults. Several use local anesthesia only when the child's age exceeds 6 to 8 years, as Weeks, Carrow and White. Others choose from 10 to 13 years as the usual age after which it is wise to use local anesthesia. Several never use general anesthetics for tenotomies, but always for advancements.

DISCUSSION.

DR. G. C. SAVAGE, Nashville, said that in treating simple heterophoria the only object is to equalize the tonicity of opposing muscles. In heterophoria of the recti, with cyclophoria, there are two objects in view in the operation; first, to equalize the tonicity of the muscles; second, to change the plane of the muscle. In orthophoria there is absolute rest of the muscles and basal centers, in distant vision, for the tonicity of the muscles is equal. In distant vision these eyes would cross except for the basal centers connected with the externi, and these are the right and left fourth basal centers. Whether the surgeon operates in one way or another, the object must be to equalize the tonicity, and to relieve basal centers. The tonicity may be altered by partial tenotomy, advancement, or shortening. By partial tenotomy of the stronger muscle its tonicity is diminished. By reducing the tonicity of this muscle Dr. Savage has put the fourth basal center at rest. If instead of tenotomizing the internus, it is decided to shorten the externus, its tonicity is thereby increased, making it equal to the stronger one, and thus relieving the fourth basal center. Complete tenotomy, however, should never be done. The LaGlieze operation is far beyond any other advancement operation that has thus far been devised. It is done without severing the tendon, the muscle being made to overlap its original site of attachment. If

the knot should become untied the last state of the patient is not worse than the first. It is, too, an easy operation to perform.

DR. WILLIAM C. POSEY, Philadelphia, referred to De Wecker capsular advancement operation as particularly applicable to cases in which there is a divergence of not more than ten degrees. This operation causes not so much reaction as that which follows the advancement of the muscle itself, no such disfigurement and no limitation of rotation of the eye. He has employed it repeatedly, and believes that it is one of the best procedures for the correction of muscular anomalies. He thinks that the single stitch advancement operation, while technically most admirable, is not always to be depended on, as the muscle which demands advancement is so often thin and its tissues delicate, and he invariably employs the double stitch operation.

DR. JOHN E. WEEKS, New York, protested against the use of a stitch that contracts tendon and muscle and bunches them up into a cord; the single stitch does this. When the tendon and muscle are doubled up the reattachment is not a proper one; it takes place at a few points only, at and near the middle of the original insertion. The subsequent contraction of the muscle can not influence the movement of the eyeball as it should. One should select an operation that will spread the muscle out and permit of a broad linear reattachment.

DR. J. A. L. BRADFIELD, La Crosse, Wis., said that in cases of internal squint combined with hypertrophia, operation on the superior or inferior recti usually is of more importance than operation on the internal and external recti muscles.

DR. MARK D. STEVENSON said that the chief objection to the tucking operation advocated by Dr. Savage, lies in the unsightliness of the eye for a long time after the operation. These patients, often operated on for cosmetic purposes, are particularly sensitive just after an operation and do not like the lumpy appearance of the bunched muscle. There is no danger in cutting away the superfluous muscle tissue, which otherwise would take a long time to disappear, as at least an approximately good result may always be obtained. When the capsule and conjunctiva are included with the muscle in the loops of the suture, there can not possibly be much bunching of the muscle. This can be regulated somewhat by the distance between the two points of anchorage in the sclera. If the suture is left in one week, there is formed a broad, strong attachment of the muscle which need never occasion any fear of its slipping. Good scleral anchorage of the suture can nearly always be obtained, but the great difficulty has been to find a suture that would securely hold the tendon or muscle in place until it became reattached to the globe. Sutures that do not have a loop so as to securely grasp the muscle are very liable to cut their way between the fibers. Since there is no means of knowing how much the suture might slip in such cases, it is impossible to know how much to over correct.

THE VALUE OF VARIOUS FORMS OF HEMOGLOBINOMETERS TO THE GENERAL PRACTITIONER*

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AND

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We have undertaken this study because the general practitioner as a rule looks on hemoglobin instruments in general as a sort of medical toy, to be used largely by the consultant, and because we believe that the use of these instruments is practicable and that it does not take more time, nor nearly as much time with some forms, as is wasted over every patient by each of us.

In 1899 one of us read a paper before the Pennsylv-

* Read in the Section on Practice of Medicine of the American Medical Association, at the Fifty-sixth Annual Session, July, 1905.

purposes are, any one of the three instruments is sufficient.

The Dare and the Fleischel allow of more accurate fractional reading because of the arrangement of the scale. All of the scales are accurate.

It appears to us that the advantages of the various instruments may be fairly stated as follows: Of the Tallquist scale, first, the cost is much less, \$1.50; secondly, the bulk is less, it may be carried in the inside coat pocket at all times without inconvenience.

The first advantage of the Dare and of the Fleischel is that both can be used either by day or night. The Dare is less bulky than the Fleischel and does not need a particularly darkened room for its use.

The greatest disadvantage of the Tallquist is that one is forced to use it in daylight. The second disadvantage is that an accurate observation can not be made between the multiples of ten, and one therefore feels less sure of the result. The disadvantages of both the Dare and Fleischel are, first, the cost (about \$20), and, second, the bulk, though the Dare is less bulky than the Fleischel. In conclusion, we may say:

1. Any one of the instruments studied by us is sufficiently accurate for practical purposes.

2. No practitioner should neglect to use one of these instruments. The Tallquist scale is cheap and convenient.

3. The Tallquist scale can be used for routine observations, and either of the other instruments for detailed and more accurate work.

4. The Dare instrument is just as accurate as the Fleischel, and takes much less time to manipulate.

5. For the general practitioner, the value of these instruments may be fairly arranged as Tallquist, Dare and Fleischel.

A STUDY OF THE METABOLISM OF ATROPHIC INFANTS AND CHILDREN.*

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METABOLISM OBSERVATIONS ON INFANTS.

Infant's and children's metabolism has not been thoroughly investigated. The importance of such work has long been recognized, but the difficulties have appeared to be almost insurmountable. Hauser¹ reviewed the work which had been done on this subject up to 1900. In this summary, he called attention to numerous errors in the work and to the incompleteness and inaccuracy of many of the results. Metabolism investigations have little or no value unless continued uninterruptedly for several days. It is essential that the diet should remain unchanged and that the feces and urine should be completely segregated and the entire quantity of each collected during this period.

SOURCES OF ERROR, AVOIDABLE AND UNAVOIDABLE.

The chief difficulty is to collect the entire quantity of feces and urine separately. In most of the reported investigations there was either a direct loss of feces or of urine, or some of the urine escaped into the feces. In some of the earlier investigations the feces were collected on the baby's napkin and afterwards scraped off; this method, of

course, resulted in an appreciable loss. In some instances the observations were restricted to one or two days, too short a time to insure accurate results. It was a long time before a satisfactory method was discovered for separating the feces of the metabolism period from the feces which belonged to the periods preceding and following it. Some of the earlier methods for the determination of fat and nitrogen were inaccurate. In some cases the food was not analyzed by the investigator, but analyses were accepted which had been made by other observers. In other cases, the usual diet was quite different from that of the metabolism period and no time was allowed for the organism to become accustomed to the change. In some instances in which the child was on a varied diet, the diet was suddenly restricted in order to reduce the number of analyses; such changes are apt to diminish the appetite and otherwise to affect the metabolism. Sometimes a quantity of food sufficient to last through the observation was prepared and samples of this food selected for analysis. This reduced the number of analyses, but the patient had to eat stale food, which may have influenced metabolism.

In addition to these errors, there still remain some that are unavoidable to a great extent and which alter the results more or less. Of these the following are the most important:

1. The effects produced on the metabolism by restraint and unusual surroundings.

2. Errors due to defects in the methods used to segregate the feces and urine of the metabolism period.

One of the ill effects which has been attributed to restraint and unusual surroundings is, that often during the time in which the metabolism is studied the feces are more watery and are passed more frequently than usual. This effect was not apparent in any of the observations which I am about to describe. In the first case, that of a child four and one-half years old, there was no restraint. Her daily habits and surroundings were unchanged. She remained at home and carried on her accustomed occupations. For the most part she remained in bed because of her condition. A trained nurse who had attended her for more than a year, continued to have the entire charge of her during the observations. This nurse was one whom I had employed many times. She understood perfectly what was required of her and I felt perfect confidence in her reliability.

In the second case, an infant one year old, the effects of restraint were rarely apparent after the first few hours. He played with toys and was happy and contented most of the time. He was always eager for his food and there was no apparent change in the number or character of the dejections with the exception of those which contained the charcoal which was added to the food to segregate the feces. He had not been accustomed to much attention, so that the constant attendance of a nurse was a source of great pleasure to him. I should say that the restraint and changed surroundings produced in his case a minimum amount of disturbance. The nurse in charge of the infant was exceptionally well adapted to the task. She was intelligent, very patient and absolutely trustworthy. During a four days' observation she never left the room for more than a few minutes at a time and she was up many times each night to see that everything was in order. A circumstance of great importance was that both nurses were deeply interested in the work. It is

* This work was awarded the Dalton Prize by the Massachusetts General Hospital.

1. O. Hauser: (references to literature) Die Neueren Arbeiten über den Stoffwechsel beim Kinde, Speziell beim Säugling Zeits. f. Diätet. u. physikal. Therapie, vol. III, 1899-1900.