ulation may take place because of prolonged arterial compression, and a corresponding change in the vascular symptoms result.

The disturbances of innervation of the hand and arm are said to be more frequent than those connected with the blood supply. Sensory symptoms are more evident than motor, though spasm like writer's cramp, inability to extend the elbow, and muscular atrophy from degeneration of nerve supply do occur.

The numbness, formication, tingling, hyperesthesia and other evidences of nerve irritation or inflammation are referred especially to the ulnar side of the forearm. If a greater number of nerve fibers are subjected to pressure, or suffer from its secondary results, this area will be much increased and may involve the whole or nearly the whole of the upper extremity. The shoulder and chest may be the seat of pain. The neuralgic pain may be exceedingly severe; and may be intermittent or continuous. It is not certain that the sympathetic nerve is ever involved. Proptosis, dilated pupil, unilateral sweating and other supposed evidences of pressure on the ganglia of the sympathetic in the neck have been mentioned as possible symptoms due to cervical rib. The muscular symptoms are spasm and atrophy.

A study of the symptomatology reveals the reason for physicians making diagnoses of writer's cramp and palsy, rheumatism, neuralgia, muscular atrophy, aneurism, etc., of unknown origin. The possible existence of cervical ribs beginning to cause pressure symptoms should ever be present in the practitioner's mind. The recollection of this possibility will lead to a correct understanding of many heretofore obscure cases. The x-ray makes the diagnosis easy.

TREATMENT.

The treatment is excision of the anomalous cervical rib in all cases of severity. The operation, if done well, is practically free from danger, though it naturally varies in its surgical importance in each case. The entire rib should, as a rule, be removed. Subperiosteal resection is not wise, as a regenerated rib may exert pressure again. Injury to vessels, nerves and pleura is to be deprecated and may usually be avoided by the common expedients available to operators. Pneumothorax, local and general palsy of the extremity and troublesome bleeding have been caused in some operations. These mishaps are unusual.

The palliative treatment in mild cases consists in rest of the arm, suspension of the patient, local counter-irritation, liniments and massage. The constant electrical current (8 to 10 milliamperes) may be employed, with the anode used as the active electrode. The combined faradic and galvanic current may be found useful.

ABSTRACT OF DISCUSSION.

DR. J. CLARK STEWART, Minneapolis: The advantage of such papers as this is that they familiarize the profession with a clinical entity, which, while it may be rare, is of the greatest importance, especially from a diagnostic standpoint. No one can make a diagnosis of a condition with which he is absolutely unfamiliar. A study of the subject shows that cervical ribs are very common, probably very much more so than even a study of the literature would show, because the condition has hitherto been so seldom recognized.

Cervical ribs which cause symptoms are rare, but it is imperative that if the signs of the condition which Dr. Roberts has so briefly gone over are to be recognized and treated everyone should recognize the possibility of this condition

causing these symptoms. I think that the great bulk of these cases which are noted and described have been discovered on account of the deformity, the broadening of the lower part of the neck on one side, accompanied by an elevation of the scapula on that side. The x-ray, of course, demonstrates the character of these ribs. The lesson to be learned from the paper is the necessity for careful examination of every case of brachial neuralgia, whether accompanied by atrophy of the muscles or not. Every such case should be submitted to x-ray examination, and in a number of cases you will be rewarded by finding an extra cervical rib. Of course, its surgical removal is indicated.

RACHITIC EROSIONS OF THE PERMANENT TEETH ASSOCIATED WITH LAMELLAR CATARACT.*

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CHICAGO.

The occurrence of lamellar cataract is so frequently associated with erosions of the teeth and the history of some early nutritional disturbance, that an inquiry as to the relationship of these two conditions must be of some interest. The following case, which is the subject of this report, illustrates the association of these conditions:

History.—C. W., male, aged 12, was first seen Feb. 19, 1908, brought to us because he was mentally backward. The father said that the boy was willing and obedient but that he made poor progress at school and was the object of derision on the playground. He had been removed from one school to another, but found great difficulty in keeping up with his classes. Incidentally we learned that his vision was defective. The family history was negative. The conditions of his birth were normal. At the end of the second month maternal nursing was no longer possible and artificial food was substituted. From this time on his feeding was a very difficult problem, a great variety of foods were tried and he had more or less continuous disturbances of digestion. His progress was very slow. The anterior fontanelle closed at the fourteenth month, though the teeth did not erupt until the second year. It is important to note that he had frequent convulsive seizures during the first year of his life, perspired excessively, was fretful day and night, and cried when he was handled. He did not stand or walk until his second year.

Examination.—The patient was a large well-developed boy of 12 years. He was not of prepossessing appearance and his facial expression was that of a dull child. The mouth remained open owing to malocclusion of the teeth. His skull was large and massive, square-shaped, and presents the evidence of an old rickets. His chest was well formed and showed no deformity. His extremities were normal. The chest and abdomen presented nothing abnormal.

Eye Examination (Dr. Mortimer Frank).—R. E. V., 6/15; L. E. V., 6/15. Under atropin retinoscopy gave:

$$\begin{aligned} \text{R. E.}, & \quad 6/0 + 5.00 \text{ } \bigcirc + 0.50 \times 105 = 6.9 +. \\ \text{L. E.}, & \quad 6/0 + 4.75 \text{ } \bigcirc + 0.37 \times 60 = 6.9 +. \end{aligned}$$

This correction was ordered for constant use. The fundus showed a marked absence of pigment; otherwise normal. The interesting feature was the transparent condition of both crystalline lenses, while at the equator placed at irregular intervals are seen the opaque short striæ or "riders" of lamellar cataract (Fig. 1).

The Teeth.—The changes in the permanent teeth showed typical malformation of the enamel, especially of the six-year-old molars. The incisors and all the anterior teeth also had defects of the enamel. The remaining permanent teeth, such as the twelve-years molars and bicuspid (which erupt after

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the eighth year), presented no traces of malformation, the bicuspid showed a slight defect at the tip. The right lower deciduous second molar was still in position and consequently had prevented the eruption of the second bicuspid, which ordinarily should have erupted three years before. The malocclusion of the teeth seemed to be acquired and was probably due to untreated adenoids. The condition was not hereditary.

SUMMARY OF CLINICAL FINDINGS.

A boy 12 years of age, with a striking history and some physical evidence of a previous rickets, who has been backward at school, due for the most part to a marked visual defect, the ocular examination shows the presence of a bilateral lamellar cataract and erosions of

Fig. 1.

Fig. 2.

Fig. 1.—Plaster cast showing malocclusion.

Fig. 2.—Schematic cross-section of lamellar cataract showing the riders (r) on the periphery.

the permanent teeth, which are thought to be rachitic in origin.

LAMELLAR CATARACT.

The most frequent form of cataract found in children is of the lamellar or zonular type. It has a peculiar and well-marked characteristic, in that the cataract is caused by a shell or layer of opacity lying between the clear nucleus and the cortex of the lens. Along the periphery of the opacity, which is usually well marked, small opaque dentations are frequently found embracing the inner opacity in front and behind which are called "riders," which signify a commencing opacity of a second layer (Fig. 2). These are present at first only at isolated spots along the equator of this first layer.

THEORIES AS TO THE CAUSE OF LAMELLAR CATARACT.

Various theories have been advanced to account for this condition. Davidson and Horner, of Zurich (1865), were the first to maintain that lamellar cataract was caused by rickets. This view has been accepted in some quarters and rejected in others, notably in England. The supposed etiologic relation of rickets to lamellar cataract is well summed up in Fuch's text-book on Diseases of the Eye:

Lamellar cataract almost always affects both eyes, its time of origin falls within the first years of life. It is found above all in those children who have suffered from convulsions. Convulsive seizures at this time of life are nearly always due to rickets, and are, furthermore, associated with other rachitic changes—particularly craniotabes.

Arlt states it as his experience that lamellar cataract is found primarily among individuals who have suf-

fered from convulsions in infancy and he thinks that on account of the severe commotion of the eyes during the convulsive seizure the elements of the lens become disturbed and the normal relationship of the fibers has been changed, thus producing the opacity. Peters, who reviews the subject of lamellar cataract in Volume 10 of *Lubarsch u. Ostertag*, calls attention to the relation of this condition to rickets and tetany, and also to the fact that tetany in adult life may produce changes which lead to the formation of cataract. The perversion of metabolism in tetany, he thinks, produces toxins which are capable of injuring ciliary epithelium, and may also change the composition of the aqueous humor. Peters further states that tetany not only produces cataract, but also trophic changes in the hair, the nails, the skin and the teeth. This discussion might be carried on at great length, but as it is well known that in children rickets and tetany are nearly always associated, and as it is maintained by most authorities that tetany is a manifestation of rickets, one may safely state that the underlying condition of the rachitic process is a nutritive disturbance.

There has been much discussion whether lamellar cataract is congenital or acquired. Most authorities, however, agree that the disturbance may occur *in utero* or during the first year of life. Becker has reported a case of lamellar cataract which was undoubtedly congenital and De Wecker one which developed in a child of nine years. If one would ascribe all lamellar cataracts as due to rickets this would necessarily presuppose the undoubted occurrence of fetal rickets. This assumption belongs in the category of debatable subjects, since fetal rickets is not universally accepted as a pathologic entity. Our experience leads us to agree with those who believe that rickets may occur in the fetus.

There seems to be no evidence of any relationship between zonular or lamellar cataract and congenital syphilis. The defective condition of the enamel of the teeth so frequently associated with the former is, as Hutchin-

Fig. 3.—Incisors showing rows of punctate depressions.

son pointed out, quite different from the notched, screw-driver condition found in syphilis.

Hutchinson does not agree with Horner in attributing lamellar cataract and the defect of the enamel to rickets. He considers these conditions more probably due to stomatitis produced by the administration of mercurial powder given for the relief of various infantile disorders. He asserts the suggestion of the Zurich investigators that the peculiarities of the teeth, the skull bones, and the general development as due to rickets to be wholly unproved and points out in this connection that the so-called rachitic teeth refer to the permanent denti-

tion, when as a matter of fact the rickets has disappeared before the second dentition has begun.

This argument is without force, because it is evident from our knowledge of the development of teeth that it is quite possible that rickets may affect the permanent set. The germs of all the enamel organs of the permanent set are present at birth, and calcification has made a considerable progress during the first two years of life, which period is concomitant with the occurrence of the rachitic process. The enamel organs of the permanent teeth are subject to the same rachitic process as the remaining osseous system. When rickets is present it is the most active during the first two years of life. During the same period the permanent teeth are actively developing. From this one may readily understand how nutritive changes may occur in the teeth. These changes present themselves in the form of erosions, and an eroded tooth may remain a permanent evidence of rickets throughout life.

Erosion of the permanent teeth is a condition which is characterized by a hypoplasia in localized areas. It should be emphasized that this condition has nothing in common with dental caries. These erosions occur with great frequency and have great diagnostic importance. In the mildest form one sees rows of punctate depres-

Fig. 4.—Showing superimposed tuberosity on molar tooth.

Fig. 5.—Cutting surface flattened and teeth shortened.

sions which surround the crown of the tooth and run parallel to the masticating surface, whereas the enamel remains for the most part intact (Fig. 3). In the severer cases one finds in place of the linear depression a more or less deep groove which involves, as a rule, only the enamel, though it may involve the dentine. These grooves may occur singly or in groups, and in this latter case they are usually parallel to one another.

The single erosions of this kind usually involve the circumference of the crown, though the condition occurs in other parts, particularly on the incisors. Occasionally one finds cup-shaped depressions of various sizes with dark colored bases. In other cases facets which appear as though the cutting surface of the tooth had been filed off. It is only rarely that one sees the so-called honey-combed teeth. Another form is characterized by a yellowish or brownish discoloration of the crown and a loss of the normal smoothness or glossiness of the enamel. Very often only the distal part of the tooth is eroded, the proximal portion remaining normal. The appearance of the erosion differs, depending on the group of teeth involved. On the incisors one notices

saw-like indentations or crescentic depressions of the cutting surface. The incisors may be normal in their proximal parts, though the body of the teeth may be encircled by a groove with a yellowish or grayish base. The canines are usually characterized by being blunt instead of pointed or they may be conical or present V-shaped depressions. In the molars the elevations or tuberosities are lost and the cutting surface is pointed. The cutting or grinding surface of the first molar has a superimposed tuberosity and appears as though a smaller tooth had grown on it (Fig. 4). Through constant use these molars in later life become short and flat and the same can be said of the incisors.

It is also true that in advanced years the erosions in the distal portion of the incisors become worn off, and as a result these teeth become shorter. They appear as though they had been cut or filed off, and in place of the sharp angular surface one notices a flat or even surface with the enamel lacking (Fig. 5). These erosions are usually symmetrical in that they involve homologous teeth and are usually affected in the same manner and with the same intensity. Erosions may involve all of the teeth, though the molars, the incisors, the canines and bicusps are attacked in the order enumerated. One author reports cases in which the teeth have shown as many erosions as a child had convulsive attacks. This, however, lacks corroboration.

Summing up the entire matter, one seems justified in concluding that in those cases of lamellar cataract associated with erosions of the teeth and with other evidence of rachitic changes or a history of convulsion during infancy, that a more or less severe rickets has produced by reason of perversion in metabolism and probably the production of toxic products, not only the erosions of the teeth, but also the lamellar cataract.

ABSTRACT OF DISCUSSION.

DR. R. B. GILBERT, Louisville, Ky.: Just what relation cataract would have to the rachitic diathesis I am unable to make out. Authors on this subject have yet to explain how cataracts occur from the deficiency of lime salts in the blood. However, Dr. Abt seems to demonstrate that cataracts do occur under such conditions. As to the erosions of the teeth, we can readily comprehend that the structures requiring lime salts, as the bones and the teeth, would naturally suffer from a deficiency of these salts. This would be especially true of the teeth as they require the hardest substance for the enamel. When there is a deficiency of the lime salts, the structure of the teeth and bones must suffer. The permanent teeth, of course, are growing and developing while the deciduous teeth are still in position, so that if the rachitic diathesis occurs anywhere from the first to the third year, the results may be seen in defects of the teeth. I take it that what seem to be erosions in many instances are due to the fact that there is not enough enamel formed to cover the dentine perfectly and it appears as an erosion. If we could study these cases most carefully before the loss of the first set of teeth, and treat the condition properly, we might save the erosion of the permanent teeth. The convulsions may possibly be due to the pressure in the subarachnoid space.

DR. J. M. DODSON, Chicago: Two or three cases described raise in my mind the question whether there is any relation between the line on the teeth and the change in nutrition in infancy. I recall a child who was given artificial food; there was considerable difficulty in finding a properly adapted food during the first four or five months of life. The child presented distinctly rachitic symptoms. After this time food was well taken, the child thrived, and the rachitic symptoms disappeared. To-day, at 11 years of age, this girl shows a distinct line in the teeth, the tooth being perfectly enameled below this ring, but with a yellowish tinge above it. The impression made on me by this case is that when the proper food was found and

the improvement in nutrition occurred, there was a simultaneous improvement in the development of the teeth.

DR. H. M. McCLANAHAN, Omaha: Rickets is more frequent now than in years past. We should more promptly recognize rickets in the early stage before these ulterior results follow.

DR. C. MARTIN WOOD, Decatur, Ill.: I wish to raise the question whether any other profound disturbance of nutrition might not produce a similar erosion. I recall a case in which a child at the age of 2 years had a severe attack of pneumonia. At the age of 15 years there was this distinct erosion on the second teeth. In this case rickets could be positively excluded. Another question is, whether there is a parallelism between this condition of the teeth and those conditions of the nails that we sometimes see in people with profound nervous disturbances or depression.

DR. CHARLES DOUGLAS, Detroit: This paper was very interesting to me as it brings out a feature that I have frequently noticed. In nursing infants when there was a marked change at a particular time in the nutrition and growth, this was followed afterward by erosions and indentations of the teeth. I have in mind a few cases in which a discoloration of the enamel was also present. I recall the case of a young woman who shows in her incisor teeth the effects of such a disturbance during the nursing period. I have often questioned mothers regarding the time of imperfect assimilation of food while nursing, to see if it agreed with these marks on the incisor teeth.

DR. I. A. ABT, Chicago: It occurred to me that this case might bring out some new thoughts as to the sequelæ of rickets. I must avoid any distinctly technical discussion on the ophthalmic or dental aspects of the case. A very careful search of the literature showed that rachitis or convulsive seizures bore in nearly every case a causal relation to the erosions and cataract. No other condition occurred with sufficient frequency to stand in a causal relation. Very many of these children have convulsions in early infancy. There may be a parallel between the erosions of the teeth and the condition of the nails referred to. One author states that erosions of the teeth may be associated with other trophic changes.

THE ADJUSTABLE CANVAS CHAIR AS AN AID TO THE MURPHY TREATMENT OF DIFFUSE SUPPURATIVE PERITONITIS.*

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To the average surgeon, the Murphy treatment of diffuse suppurative peritonitis needs no introduction. Its preeminence as a life saver in this class of cases has gained for it almost universal recognition. Its results, in the light of past experience, have been nothing short of marvelous, and there no longer can be a question of doubt as to its efficacy, but, like every other thing, the principles of which are not fully understood, it has been modified according to individual notion until in some instances it has been shorn of much of its value.

It was with the wish of correcting these false and dangerous innovations which have not only marred the work of individual operators, but have crept into literature, that I applied to Dr. Murphy for an outline of his treatment. In response, he sent me the subjoined extract from an as yet unpublished paper, with permission to use it as I saw best.

The cardinal features of the Murphy treatment for diffuse suppurative peritonitis are the Fowler position, pelvic drainage and continuous drop-by-drop instillation into the rectum of a saline solution.

The underlying principles, as I understand them, are:

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1. Drainage of the germ impregnated fluids into the pelvis, where absorption is least active, and away from the diaphragm, where absorption is most active, thus tending to diminish systemic infection. This is accomplished through gravitation by means of the Fowler position.

2. Drainage of the pelvis to prevent stasis and accumulation of the peccant matters, which is in furtherance of the same object. The drainage is effected through rubber tubes usually introduced through a suprapubic incision to the bottom of the pelvis, though on occasion the drainage may be effected through the vault of the vagina.

3. Surcharging the lymphatics with a saline solution to prevent their taking up and conveying into the general circulation the poisonous products of the pathogenic germs and the germs themselves. This is effected by rectal instillation.

It is claimed that the saline infusion into the rectum is carried by anteperistalsis the full length of the large bowel, and in this way the area of absorbing surface is prodigiously increased. Now, inasmuch as the large bowel possesses both an absorbent and excretory function, I am of the opinion that the saline infusion serves a double purpose by creating both an endosmotic and an exosmotic current, whereby the vascular channels are filled, on the one hand, with the innocuous saline solution, and the excretory products, including the poisonous matters, are, on the other hand, swept into the bowel, to be carried away with the excretions. I have seen cases in which a diarrheal discharge of distinctly fecal character went hand in hand with evidence of absorption of the saline infusion and a gradual subsidence of septic manifestations.

But, to return to Dr. Murphy's extract furnished me for the occasion, he says: "In the last five years' work in general septic peritonitis we have had 47 cases of perforative, diffuse, general peritonitis operated in the active stage, with but two deaths, and neither of these from the peritonitis. The treatment after the operation in these cases consisted in placing and retaining the patient in the semi-sitting (Fowler) position (35 to 45 degrees) for three or four days, administering large quantities of saline solution by rectum, from six to fifteen quarts in twenty-four hours; the saline must be allowed to seep in, the tube remaining constantly in position. No water should be given by the mouth, as the stomach never absorbs it direct, and under these conditions it does not readily transmit it to the intestine for absorption. Mild catharsis should be induced with small doses of calomel, beginning eight hours after operation. . . . During the transportation of cases of general suppurative peritonitis to the hospital and during the operation the patients should be kept in a semi-sitting position. . . . Use ordinary vaginal douche tips with three openings, so that the water can flow into one and the gas come out of the other. A single opening tip will not permit the gas to bubble back into the can, and the passing of gas is important. The can should be elevated from four to six inches above the anal level. The tube can be strapped permanently to the body (the thigh) of the patient with adhesive plaster, and the nurse should be carefully instructed to watch closely and not allow more than one and a half pints of the saline solution to flow in from forty minutes to one hour. The speed of the flow must not be controlled by forceps on the tube, but by elevation (or depression) of the can. A hot water bag should be used to keep the solution warm. (The can is