symptoms I decided it was not a case for refraction, but was toxic ambliopia or indicanuria. I put him on eliminative treatment, free purgation with calomel, followed by Epsom salts, directed his diet and in a few days his vision was 20-15 and he could read the finest print on the test card without any trouble.

We have another class who come to us that have refractive errors, that are sufferers with indicanuria. They tell us that their glasses do not suit them; they were all right for a while, but they have headaches and present all the symptoms of indicanuria, and insist on you changing their glasses. After examining them carefully you find that they have been properly refracted and it is then up to us to eliminate the patient and clear up the symptoms.

Again we have patients with recurrent sore throats. The mucous membrane of the throat presents a dull red appearance, with perhaps ulcerated areas on tonsils, tongue, gums, etc. Also cases of nasal catarrh, as they term it. They are continually hawking and spitting and are very much worried about their condition.

They will tell you that they have been treated by a good many specialists, had their nose cauterized and got better for a while. On examination, the mucous membrane in nose is red, inferior turbinates, swollen, some have hydroporrhea, attacks of sneezing, asthmatic symptoms, etc. As a rule they eat too much meat, have a gastro-intestinal disturbance.

There are a great many other conditions met with in eye, ear, nose and throat practice, that are traceable to indicanuria, that I will not mention.

The treatment of indicanuria can be stated in a few words; elimination with free purgation of calomel and salts, followed by such intestinal antiseptics as salol, together with the proper diet, will oftentimes cure our patients readily of the very distressing symptoms of which they complain.

The local treatment of course should not be omitted, cleansing alkaline lotions and sprays should be used together with other local measures as are indicated.

In conclusion let me emphasize that elimination is the mainstay in the treatment of uric acid diathesis and indicanuria.

SUPRA-CONDYLOID FRACTURES OF HUMERUS.*

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Certainly the majority of the profession are not yet ready to adopt the dictum of Lane in regard to fractures. "Operate in every case." Dr. Richard Harte opposed the above dictum at the American Surgical Association (1911) and advocated a more thorough routine treatment of fractures in general by men of experience rather than relegating the management of these cases to their assistants. His main objections were based on the increased mortality following a routine operative treat-

ment, the necessity of special instruments, the increased danger of wound infection, and last, but not least, the difficulty of some of these operations.

Well-equipped hospitals are not to be found in every place, and unless the work of converting simple fractures into compound fractures is done with the most rigid attention to the details of asepsis, it is attended with many dangers. This is so well appreciated by Mr. Lane that he advises the most scrupulous care

*Read before the Section on Surgery of the Southern Medical Association, Hattiesburg, Miss., November 12-14, 1911.

in the use of instruments, so that little traumatism may be done, and the hands touch the wound as little as possible.

Bartlett and Hewitt have recently further emphasized the danger of infection by a series of experiments. They introduced screws into animal bones, in some instances using infected screws and in other cases aseptic screws, and after variable periods of time they measured the amount of force necessary to remove them. In every instance the conclusions were the same. When the wound and screw hole were infected, it required less force to extract the screw than when the wound had been made with aseptic technic. They say in part, "An average pull of 95 4-5 pounds is required to dislodge clean No. 3 $\frac{3}{8}$ -inch screws from dog bones with average cortex of 2 m.m. after they have been in place from one to seventy-one days. On the other hand, 41 7-9 pounds will accomplish the same thing with infected screws."

This is not intended as a plea against operation in selected cases where other methods fail, but in view of the facts that indiscriminate operative management is attended by a higher majority even in the best hands, (Bartlett records a death rate of over three per cent); that operation in some cases is exceedingly difficult, and that there is increased danger of infection, and consequent easy dislodgement of screws, make it worth our while to obtain a better knowledge of the underlying mechanical principles involved in the proper reduction of deformities after fractures.

Deformity following fractures may usually be attributed to, (1) the fracturing force, (2) muscular action, and (3) to gravity.

Many of us without considering the resultant of muscular action, in the case of the fracture in question, still make use of extension, and failing to obtain a proper apposition of the fragments by this method are willing to try operative means to secure the desired result. There are certain cases which on account of extreme youth, age or disease pre-

clude such a measure with a reasonable degree of safety. Especially are children undesirable subjects for such measures on account of the danger of interfering with the nutrition of the epiphyses.

Ashhurst has added greatly to our knowledge of this fracture, and we will do well to heed many suggestions made by him.

Supra-condyloid fractures are more common in childhood; in Ashhurst's series of twenty-one cases all of the patients were under eleven years of age. There are two distinct types of fractures, the so-called "flexion" and the "extension" fractures, the later being by far the more frequent.

The cause of fracture is usually a fall on the outstretched palm, the resultant fracture being obliquely upward from before backward, the lower fragment being displaced backward. This is the so-called "extension" variety. The mechanism of this fracture has been well explained by Ashhurst as follows: In falls on the outstretched hand the force is transmitted chiefly to the radius, as the ulna does not articulate with the carpal bones. From the radius the force is transmitted directly to the external condyle. The force of the blow is transmitted to the ulna through the interosseous ligament and in turn to the internal condyle."

He also insists, that besides the force expended as above stated, the anterior and lateral ligaments tear off the lower extremity of the humerus when hyper-extension follows a fall on the outstretched hand.

The deformity in this instance is not to be attributed solely to the fracturing force and the ligament action, as the triceps pulls the olecranon upward and backward and in doing so draws the lower fragment in the same direction the biceps and the brachialis anticus draw the lower fragments upward; the muscles attached to the internal condyle, which extend down the forearm tend to keep the lower fragment flexed on the forearm. The re-

sulting deformity resembles a backward dislocation of the elbow.

The "flexion" type of fracture is very rare, and is generally found only in adults. The fracturing force is usually applied directly to the elbow from behind. The deformity is not as marked as in the preceding fracture, as the line of fracture is obliquely downward from before backward; instead of a backward displacement of the lower fragment, there is forward displacement. This is due in part to the fracturing force, the combined actions of the triceps and biceps, the action of the muscles attached to the internal condyle and the fact that the lower end of the proximal fragment is lower than the lower end of the distal fragment.

Treatment—The problems to be met in the treatment of this fracture are the reduction of the deformity, by bringing the lower fragment in the axis of the shaft, and to maintain that reduction.

In order to relieve the impaction, which sometimes exists, and to overcome the action of the triceps and biceps, the first steps should be hyperextension and traction. "Hyperextension momentarily increases the deformity by rotating the lower fragment on its transverse axis, as a result of the action of the muscles attached to the epitrochlea and epicondyle (Ashhurst). This is overcome by extension and counterextension on the forearm and arm while the surgeon acutely flexes the forearm on the arm. "Hyper-flexion" is the position of greatest stability according to Ashhurst, because the lever action of the forearm is overcome and because the triceps acts as a natural splint to the humerus in that position. The dressing is very simple, one or two turns of adhesive plaster may be used if accompanied by a sling around the wrist and neck, others make use of a small pad of cotton in the flexure of the elbow and a roller bandage, which encloses the forearm and arm very much as you would a conical stump. Ashhurst advises

that we cover the hand, because of a secondary swelling which may arise from the hand being unsupported if not bandaged. Many make the mistake of using a Velpeau bandage or the second roller or Desault. The use of these is not to be recommended because free access to the axilla is impossible, and because the shoulder is unnecessarily immobilized; further it is a known fact that abduction and adduction of the fixed elbow do not disturb the position of the fragments.

Conclusions—A comparison of the results obtained by hyper-flexion and other methods will undoubtedly convince one of the superiority of this method of treatment. Ashurst reports ninety-four per cent perfect results. Coenen twenty-five per cent perfect results (obtuse angle) and Cotton reports eighteen and five-tenths per cent perfect results (right angle splint).

(2) Extension should never be employed, (a) as it favors the lever action of the muscles of the forearm and a consequent flexion of the distal fragment on the forearm; (b) should ankylosis occur the forearm will be in the least useful position; (c) gunstock deformity is more frequently a result from this method than from other methods named and because the action of the biceps and triceps is difficult to overcome by the use of anterior and posterior splints.

(3) Since hyper-flexion is the position of greatest stability it is the position most favorable to good results.

Case Report—A. C., age five, white, male. Family history and previous personal history have no bearing on present injury.

Present Illness—While playing he fell on the outstretched hand. He was immediately seen by an uncle, who is a physician. The doctor put on a temporary anterior and posterior extension splint, believing the fracture was probably a fracture of the olecranon, and as soon as he could bring the child to the infirmary for a radiograph he did so. While

there he asked me to examine the child. The radiograph showed a typical supra-condyloid fracture of the extension type.

The arm was then put up in hyper-flexion, adhesive strips were used and this followed by a roller bandage encircling the forearm and arm. As an extra precaution, as I then thought, I applied a roller to the arm and chest in order to immobilize the arm. After five weeks the child was permitted to use the elbow rather freely, passive motion having been used in the mean time. There was neither deformity, nor limitation of motion about the elbow.

He has recently had another fracture near the same joint or I should have a picture to show the lack of deformity. The accompanying skiagraph hardly shows the line of the old fracture or deformity at the seat of it. The result, according to the standards set by Ashurst were perfect.

A. C., age six years, residence 1059 Washington Avenue. Accident occurred Wednesday, October 11, arm set at angle forty-five degrees for about ten days, after set in angle of fifteen degrees arm taken down and passive motion used, then arm set in a straight splint. Results almost perfect functioning. X-ray shows seat of fracture.

DISCUSSION.

Dr. Parham, of New Orleans.—I arise rather as an advocate for the extended position in the treatment of these fractures, but I think it is necessary to say, in order to explain, while there might be a difference of opinion between surgeons who may get equally good results by hyper-flexion and hyper-extension that we ought not to lose sight of the fact that those fractures should always be treated under an anaesthetic, and with the assistance of the X-ray. If we do that, I think we will have better results in our treatment. If we know exactly whether we have the fracture reduced, when we put on the apparatus, then, after we put on the apparatus, all we have to do is to maintain the fracture in that position by our apparatus, using the X-ray to determine whether we have actually got the fracture reduced. It does not make any difference what position you put it in, really, if you have got it reduced, and you must see that it is maintained in that position. I believe, however, that it is easier, as Allis showed many years ago, to maintain a reduction which you have accomplished by manipulation under

anaesthetic in the hyper-extended position, than in a flexed position. Allis showed many years ago, in speaking of fractures about the elbow, that it was almost impossible to prevent some movement of the fragments in the flexed position. If you put on the apparatus in such a position in the extended position, I think you are better able to control the action of the muscles. You can utilize both the anterior and posterior muscles as splints, so that once you have the fracture reduced you can maintain it better in that position, in my opinion. And besides, what is so difficult to prevent—you can prevent the loss of the carrying function. In many of these fractures the carrying function is more or less completely lost, and this, I believe, may be much better cared for in the extended position than in flexion.

Dr. Cohn.—How about ankylosis, should it occur in the bended position?

Dr. Parham.—That is unfortunate. I believe it is easier to restore the flexed position with the arm stiff in extended position than to restore extension with the arm in the flexed position. Of course, I do not deny that ankylosis in extension would be a greater disability than in flexion, but I believe the surgeon better enabled to prevent ankylosis by treating the fracture in extension.

Dr. Roberts, in the Pennsylvania Hospital, many years ago showed me a plan of treatment which he carried out in elbow fractures, including supra-condyloid fracture, where he put the arm at an angle of 135 to 150 degrees. The splint was arranged also with a lateral angle corresponding with the salient internal angle. This lateral angle was intended to guard against the loss of the carrying function. By the usual methods of treatment, the angle in many of these cases Dr. Allis showed by diagrams, instead of being salient inwards was lost entirely or even salient outwards. It was important to preserve this carrying function.

I believe the important thing for us to bear in mind is this: Not to stick to any one position, except with the assurance of X-ray examination, and the use of a surgical anaesthetic, especially in children, and to see that reduction is effected before the arm is put into any position at all for permanent treatment.

Now, so far as the use of the open operation is concerned, I think that most of us now are disposed to believe that we are not justified in opening a limb to set a fracture, if we feel reasonably sure that we can set that fracture properly and maintain it without doing it.

However, there are, as Dr. Martin has suggested, certain fractures where you have such difficulty in reducing or maintaining the adjustment that one must resort to some internal fixation. Now, I do not hesitate in such an instance to put on a plate. I have used for some time an ordinary aluminum plate which I could myself cut practically at the operating table with scissors. I have been recently using the Lane plate. I have had occasionally to take the plates out, owing to some infection. The wounds then healed well and the results were good.

So, I am an advocate, especially in cases such as Dr. Cohn has mentioned, where you are not otherwise sure of preventing deformity, which is apt to occur in certain cases, of getting down and seeing that those fragments are put in proper position and

held there. After this, any sort of a splint will do that will maintain the arm at rest.

Dr. Cohn.—In regard to using operative means, he limited himself to any age and did not say whether it was intended for children or not. I want to ask if he included children in the classification—children under the age of eleven or twelve in the classification that he was operating on.

Dr. Parham.—Yes, I would include them—I would treat children's as I would other fractures, except that you would not have to resort so often to the open treatment.

Dr. Martin.—If I can possibly do so, I will illustrate it, and you can see at once that Dr. Cohn's treatment is correct. (Dr. Martin draws a figure on board). Now, here is about the fracture (indicating) a little high, it is true, but we have first to understand the mechanism of this fracture, caused by falling on the wrist of the hand. Necessarily the force is exerted at this point. We have here flexible muscles attached at the condyle, and it is going to give way at the weakest point—you see at once what occurs at the time.

Now, the only way to reduce this is to force it back, and there is but one way of forcing it back logically, and that is by extension, because the more you extend, the more you pull on this point. Extending has a tendency to force it down, and it is impossible to get a supra-condylar to stand, but by flexing, you can get it down in this position, and it presses back into the band and the band holds it in position. So we see the danger of extension. The danger of extension is simply in fractures of this kind, to aggravate the condition that exists, and the tendency is to irritate the biceps muscles, and triceps, which will always occur in these conditions.

If you can once reduce this fracture this way down, you see that it will stay in position after being replaced. There is one danger you must not forget, and that is, when setting it in that way we may sometimes have it united but little laterally, and if the arm is extended, it will be extended out one side or the other. That is one danger, but that is the least to fear.

If, however, we are dealing with fracture of the condyle or fracture of one side—one or the other—then my attention is always given to extending the arm first, and get your fracture in place, and by making observation, get the arm as it should be. By holding it straight for a week or so, and then reducing it, before putting it at right angles, you will get it well without deformity. If this fragment happens to slip up, as it sometimes does, when the arm is straightened in the other method, you see what the trouble is. This treatment applies only to condyle fractures—when you get at this point down there (indicating), because you have the triceps on one side and the biceps on the other being constantly irritated, and you cannot dress it, and if you do, you cannot hold it in position.

I do not advocate it on every case, but I have had enough of this work to discuss it intelligently. I have never treated it successfully without holding it

in place by staples. This treatment suggested by Dr. Cohn is, to my mind, the simplest and best that we are using, by which it can be held in position, and it generally can.

Dr. Scott.—I have seen very few of these cases, but the cases I have seen have been the old results, and most have been flexed generally. I have been using on these cases a little rubber band; it has a certain tension that is bound to overcome muscular action. You can almost get the arm to a straight position in a few hours under the rubber band; it will go back up. I have repeated that twice a day. When it comes to the question of passive motion, to get a child to do this with one arm is difficult; but if you put both arms on the table and get them to do it together, the child will do it much better.

The Chairman.—This is a very interesting subject, but we have a good many papers which we want to take up this afternoon, and for that reason I will ask Dr. Cohn to close.

Dr. Cohn, of New Orleans.—I am going to apologize to Dr. Martin, but I wish to call attention to the fact that he has drawn, not intentionally, of course, but just to illustrate a point—he has drawn the line of fracture of the flexion type, rather than of the extension type. Now, if we have an arrow to represent the attachment of the triceps about the olecranon process, and put the arm in extension and allow the lever motion of the muscles in the forearm to be brought into play, when the triceps draw backward and upward, the deformity is increased. In other words, the lower fragment is brought more nearly into the elbow than before. If it is acutely flexed, the triceps acts as a natural splint, and with the increased lever action of flexor muscles of the forearm in that position, we get a position of the greatest stability.

Cotton records his best results from the right angle treatment, in which he got 18.5 per cent; with the obtuse angle, something like 25 per cent. Dr. Ashhurst got 94½ per cent of perfect cures—perfect extension and flexion, and that is a very good argument for that method of treatment.

Another good reason why I do not believe that extension is as good as hyper-flexion is that it is not even mentioned in the collection of cases by Ashhurst.

I don't want Dr. Campbell to misunderstand me when I state that after five weeks that child had perfect flexion; he had not been kept in one position, but passive motion had been instituted in the meantime.

Changes of position, I believe, is advocated. In other words, it is not advocated to keep the arm in one position all this time. Don't have a complete sling, but a little sling around the neck and wrist.

Dr. Martin, if you will permit a digression, in regard to fracture of the shaft, I believe we will get fairly good results if we use the triangle in the axilla extending down to the condyle instead of using the internal and internal right angle splint.*

*No illustrations for the foregoing article have reached the Journal office.