

of benumbing all sensation, and, when restored to consciousness, she expressed great surprise at their removal.

The parts were brought in close apposition by sutures, straps, and firm bandages, and dressed with cold water. Union of the



FIG. 4.

FIG. 5.



FIG. 6.

FIG. 7.

whole wound, in each foot, took place by first intention without the formation of any pus, and in twenty-three days after the operation she walked to my office (nearly one mile), and the second casts were taken from her feet, from which the improved drawings were made. (See Figs. 5 and 7.)

The most singular feature in this case is, that, from the moment she became convinced that her feet could be improved, her chorea left her, and has not returned; neither has she had a single epileptic convulsion.

I removed the extra finger under the influence of chloroform, at the carpo-metacarpal articulation, by a straight incision on the

back of the hand. The wound united by first intention, and the hand looks quite natural, as is seen by contrasting Figs. 8 and 9.

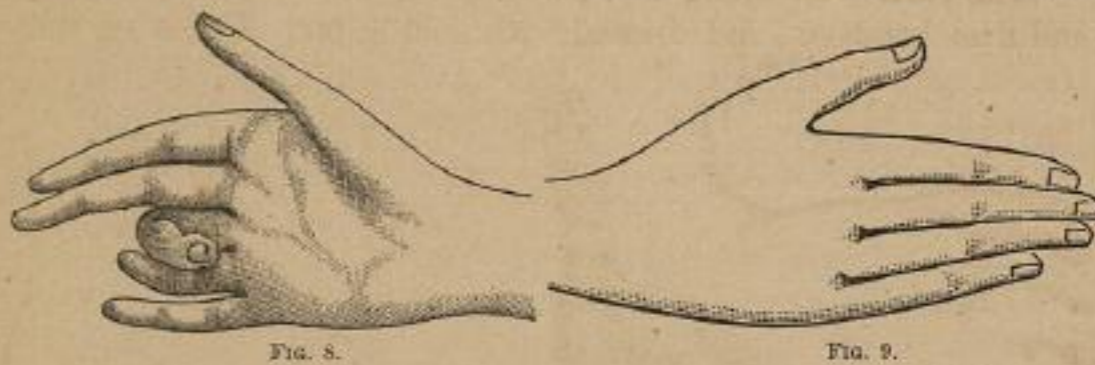


FIG. 8.

FIG. 9.

DIAGNOSIS.—The rules for making a diagnosis will be considered in connection with the study of each deformity.

LECTURE IV

DEFORMITIES.

Treatment.—General Principles.—Operative Treatment.—Tenotomy.—Myotomy.—Tenotomies.—Breaking up of Bony or Fibrous Anchylosis.—Anæsthetics.

GENTLEMEN: To-day we begin the study of *treatment* of deformities, and I will first invite your attention to the consideration of certain general principles.

TREATMENT.—The treatment of congenital deformities should commence *early*. This rule is especially to be observed in all those cases in which the deformity depends upon disorders of muscular power that are of a paralytic nature. When we come to speak of the treatment of congenital club-foot, we shall insist very strongly upon the recognition of this principle.

The great reason why treatment of this class of deformities should be commenced early is, the hope of preventing irritation or inflammation of the parts abnormally pressed upon, as well as the muscles and fasciæ involved, which may add a spastic deformity to the already-existing paralytic one.

Again, early treatment is important for the sake of prevent-

ing the development of serious nervous diseases. For example, in the case already alluded to, the girl was suffering from chorea, or something analogous to it, because of the impression made upon her nervous system by the presence of her deformity, and she became perfectly well the moment she was satisfied that it could be rectified. Her case, therefore, furnishes strong proof of the necessity of attending early to the correction of any such malformations.

Acquired deformities can very frequently be prevented by early attention to the underlying disease which produces them; and, as the knowledge of how to *prevent* deformities is equally as important as how to treat them when they are fully developed, the diseases upon which such acquired deformities may depend will be very fully considered in our subsequent lectures.

We now come to the consideration of the subject proper. The treatment of deformities may be divided into *operative*, and that by means of *mechanical appliances, manipulation, the application of electricity, the use of drugs, etc.*

Under the head of operative treatment, we have tenotomy, myotomy, and breaking up of bony and fibrous formations.

By the term *tenotomy* we mean section of a tendon. The instrument commonly employed for this purpose is called a tenotome. *Myotomy* means section of a muscle.

When it is necessary to divide fascia or fibrous bands, they are to be cut in accordance with the general rules which govern the division of muscles or tendons. The history of tenotomy and myotomy has already been referred to in our introductory lecture.

For the purpose of performing these operations, you will require knives or tenotomes having a peculiar construction. The handle of the instrument should be so constructed that you may always know in which direction the edge of the blade is turned (which may be indicated by a dark spot upon the handle). If this precaution is not taken, when the blade is buried deep beneath the tissues, you will be ignorant of the exact direction of the cutting edge, a thing always to be borne in mind. The shank should be strong, and firmly inserted into the handle. Its length should be from one inch to one and three-quarters inch, with a blade three-quarters of an inch to an inch in length, according to the size of the tendon to be divided. The blade should be made very thick at the "heel," very narrow in the cutting portion, and *always*

blunt-pointed. The point should be somewhat rounded, and sharpened from side to side like a wedge or chisel, so that when introduced it splits rather than punctures the tissue through which it passes. (See Fig. 10.) The instrument should be made of the



FIG. 10.

finest-tempered steel, otherwise so small a blade as this, in cutting through a permanently contracted tendon or fascia, or any portion of tissue that has undergone structural change, is very liable to be broken. These blades are made of various shapes; some straight, and some curved, with the cutting edge either on the convex or concave border. The sharp-pointed tenotomes usually found in the shops should never be used, as they are liable to puncture tissues which should be unmolested; and their use in the neighborhood of important vessels and nerves is very hazardous.

The next important question is, How are we to determine whether, in any given case, we shall be compelled to resort to tenotomy?

The law, which is of universal application in deciding this question, is the following: Place the part contracted as nearly as possible in its normal position, by means of manual tension gradually applied, and then carefully retain it in that position; while the parts are thus placed upon the stretch, make additional point-pressure with the end of the finger or thumb upon the parts thus rendered tense, and, if such additional pressure produces *reflex contractions*, that tendon, fascia, or muscle, must be divided, and the *point* at which the reflex spasm is excited is the point *where* the operation should be performed.

If, on the contrary, while the parts are brought into their normal position by means of manual tension gradually applied, the additional point-pressure does *not* produce reflex contractions, the deformity can be permanently overcome by means of constant elastic tension, and the more you cut the greater will be the amount of damage done. This is an important law, which you will do well to remember; for its application, as already re-

marked, is universal in deciding the question of cutting contracted tissues. Even when the parts can be completely restored to their normal position, by means of manual force gradually applied, if this additional point-pressure produces pain or spasm, the contracted tissue must be cut before a complete cure can be effected.

The next question that arises is, How is the operation to be performed?

1. By your own hand or by that of an assistant, put the parts to be cut fully upon the stretch.

2. Make the cut subcutaneously, and thrust the tenotome through the integument at such an angle as will make a valvular incision. (See Fig. 11.)



FIG. 11.

3. Introduce the tenotome flatwise (see Fig. 11). Carry the end of the knife through the tissues slowly until the tendon is reached; then carry the blade flatwise beneath the tendon to its opposite side, and turn its cutting edge toward the tendon (here you see the importance of having the handle of the tenotome marked in such a way as will indicate the direction in which the cutting edge is turned), and then press the tendon down upon the edge of the blade, at the same time giving the instrument a slightly sawing motion until the tendon gives way, which can be recognized by the finger, and not infrequently by an audible snap. It is exceedingly important that your section of the tendon should be complete, otherwise the deformity will remain unless you forcibly rupture that portion which you have failed to

cut. The instant the tendon is severed, the instrument is turned flatwise and withdrawn. As it is withdrawn, slide your finger or thumb over the wound, thus forcing out any blood that is in the track of the knife, and preventing the entrance of air. The wound should then immediately be hermetically sealed with adhesive plaster, being careful under no circumstance to carry the plaster completely around the limb, and the plaster be secured in its position by a roller-bandage. The application of these principles will be fully illustrated when we come to the treatment of special cases.

The next important question is, Shall the parts after section of the contracted tissues be restored as nearly as possible to their normal position at once; or shall a delay be made of a few hours, or a few days, until the external wound has permanently closed, and the inflammatory action which may follow the operation has subsided? For many years my teaching was to secure the limb in its deformed position until the external wound had closed, and the inflammatory action had subsided; but at present it is, that the deformed parts should be restored at once as nearly as possible to their normal position. This is the general rule which I feel willing to lay down as the one which should govern you in the majority of cases, but to this rule there are notable exceptions. In all deformities dependent upon abnormal muscular action alone, whether paralytic or spastic, restore the parts as nearly as possible to their normal position immediately after section of the contracted tissues has been made. In all cases, however, of acquired deformity which depends upon previous disease of a joint, terminating in fibrous ankylosis, and in which section of the contracted parts becomes necessary, the division should be made, and the external wound be permitted to heal before resorting to force for the purpose of breaking up the ankylosis. If motion and force are applied in this class of cases immediately after section has been made, air may enter the wound, inflammation follow, and suppuration be established.

The breaking up of bony or fibrous ankylosis, such as is liable to occur in connection with joint-disease, may be accomplished by muscular or mechanical force. In many cases the breaking-up process and the cutting operation are both necessary before the distortion can be corrected. The special treatment to

be adopted in this class of cases will be mentioned when we come to the consideration of complete and incomplete ankylosis.

ANÆSTHETICS.—Shall we use anæsthetics in orthopedic operations?

A majority of operations for the relief of deformities of the foot I prefer to perform without resorting to their use. The pain connected with the operation is very slight, hence the administration of an anæsthetic is not necessary as an act of humanity. The child cries through fear of the knife principally; and there are some instances in which the nervous system of the patient is such, that great fright may bring on convulsions. Of course under such circumstances the administration of an anæsthetic is proper. The contracted tendons should be brought into as bold relief as possible, and the irritation produced by the crying of the child will cause an additional contraction, that will bring it more distinctly into view. In all the more severe operations, anæsthetics should always be used.

LECTURE V.

DEFORMITIES.

Treatment (continued).—Mechanical Appliances—General Principles governing their Use.—Elastic Tension.—Adhesive Plaster.—Electricity.—Instrument for testing Muscular Tissue.—Cases.

GENTLEMEN: We will continue the study of our subject this morning, by first directing our attention to the employment of mechanical appliances in the treatment of deformities. Such appliances are of great service, and, in fact, are very essential.

Until very recently the use of mechanical contrivances has been the most valuable means of rectifying deformities possessed by the orthopedic surgeon, but, with the improvements we now have at our command, we are enabled to do more toward the restoration of a deformed part in a single day than could formerly be done in weeks or months. Restoration in fact is, in many instances, only possible when the operation is followed by a properly-applied apparatus.

Great ingenuity has been displayed in the manufacture of different instruments, and many complicated contrivances have been devised for the application of mechanical force. Occasionally, demand upon the ingenuity and skill of the mechanic is required; but, as a general rule, elaborate and complicated instruments should be avoided. The principal requisites of an orthopedic apparatus are, simplicity, facility of application, and lightness as far as compatible with the object to be accomplished by its use. It should never encircle a limb or trunk in such manner as to interfere with the circulation, nerve-currents, or natural movements of the part. I would caution you against such interference. You can all easily understand that, if the muscles and the vessels supplying them—the nerves, veins, and arteries—should be girdled with straps or heavy instruments, binding them down upon the bone, the effect would be to obstruct the supply of blood to the limb, with its attendant disaster, gangrene. Thus, a badly-contrived instrument will rather add to the gravity of a case than relieve it. For an apparatus to be truly useful, it should be as simple in its construction as circumstances will permit, and should compress the limb in its circumference as little as possible. It should act in its tractile force gradually and constantly, and, as the line of deformity is slowly changing its direction, it becomes very necessary that the apparatus be frequently removed and reapplied, or adapted to the new line of distortion. The persons in charge of, and using the apparatus, should thoroughly understand their manner of action, be perfectly acquainted with their mechanism, and the object to be gained by their application. At the outset the practitioner should adapt the instrument to the deformity, and not the deformity to the instrument, as is too frequently attempted. Proceed in a gentle manner until the first difficulty is overcome. The pain experienced in the part soon wears off as the mind becomes more tranquil, and then you can, day by day, bring to bear upon it such force as will tend to secure the desired object.

In the use of any apparatus, if you put on the screws and straps by which it is adjusted, and tighten or loosen and strengthen them as opportunity offers without any order or design, you are liable to increase the existing difficulty and to retard recovery. Therefore, you must make it your maxim in these cases to "make haste slowly." The principle which should con-