PROVINCIAL MEDICAL & SURGICAL JOURNAL.

CLINICAL LECTURES ON DISLOCATIONS, DELIVERED AT THE CHARING - CROSS HOSPITAL.

By HENRY HANCOCK, Esq., Surgeon to the Hospital.

LECTURE IX.

RUPTURE OF THE TENDON OF THE LONG HEAD OF THE BICEPS.

This accident may be occasioned by falling upon the arm, by violent twists of the limb, without external violence referred to the part, or by the sudden and violent extension of the limb, as when we put out our arms to save ourselves in falling. The patient experiences at the moment, a sensation of snapping in the shoulder, soon succeeded by inability to raise the hand to the head; acute pain is caused by even slight pressure in the course of the bicipital groove, or lower down, on the muscle itself; the latter becomes flabby, and the movement of the arm backwards and forwards produces acute suffering, mostly referred to the situation of the biceps, where it passes over the head of the humerus. In one case, related by Mr. Stanley, to which I shall hereafter refer you, the effort of bending the forearm was attended with peculiar spasmodic vibrations of the biceps. There is also swelling in the course of the biceps. The head of the humerus is drawn upwards and forwards, and approximates the acromion process, more than natural. Mr. Stanley, in an interesting paper published in the third volume of the *Medical Gazette*, relates the following instances of this accident.

CASE I.

A gentleman slipping, fell with his shoulder against the curb-stone, twisting his arm inwards and backwards; severe pain in the joint, and inability to use the biceps muscle immediately followed, and in a few hours, effusion of blood into the cellular tissue, confined to the course of the biceps. The slightest movement of the arm backward, was excessively painful, precisely in the situation of the biceps tendon, where it passes over the head of the humerus. The arm was confined across the chest, to quiet and relax the muscle, and the pain continued unabated many weeks. He was ultimately cured.

CASE II.

A man in Cornwall, scuffling, fell on his arm, which was thrown backwards at the time. He felt something give, way in his shoulder, and soon could neither raise his arm to his head, nor hand to his mouth. The most gentle application of the fingers towards the

head of the humerus, between the coracoid and acromion processes, or lower down the arm, in the course of the biceps, produced acute pain, but nowhere else, either by pressure on the joint, or free motion. The biceps was shortened, soft and flaccid, and could not be made to retract. The patient was treated for rupture of the biceps tendon; gentle motion was allowed in four weeks, and he ultimately recovered.

CASE III.

A woman, aged 35, slipped down in the street, and extended her arm to save herself; she experienced acute pain in the shoulders, on attempting to bend her elbow, raise her arm, or when pressure was exercised over the course of the biceps tendon. The effort of bending her forearm was attended with peculiar vibratory movement of that part of the biceps, whence the biceps continued and was distinctly felt. Pressure could be borne without pain at the end of four weeks, but the power of the biceps was not at that time restored.

Mr. Knox, in the 14th number of the same Journal, mentions four cases in which this tendon was defective and adhered to the margin of the bicipital groove, instead of running to the glenoid cavity. In five of the seven cases related by Mr. Smith, the tendon of the biceps had been ruptured, and was attached to the anterior margin of the bicipital groove. Mr. Hargrave, in the 48th volume of the *Edinburgh Journal*, says, that he has often found the biceps tendon ruptured in old people without other lesions. From the cases I shall have to relate to you, when we treat of partial luxations of the head of the humerus, we shall learn that in several instances, the latter accident may be complicated with rupture of the tendon of the biceps. What influence the giving way of the tendon has, in the production or favouring of these accidents, will be further considered by and bye.

Dr. Labatt laid a preparation before the Royal Surgical Society of Paris, in March, 1838, taken from a woman aged 60. The head of the humerus was firmly supported against the acromion process, by a vertical rent in the capsular ligament which girded its anatomical neck. The head of the bone was widened, but completely denuded of cartilage. The tendon of the biceps was exceedingly thin and wasted, and on tracing it up in the groove, it was found to terminate by a firm insertion into the upper part of its outer edge, sending off internally a fibrous production, which almost immediately became continuous with the capsule, running along the inner lip of the rent towards the apex of the glenoid cavity; but to which it was not clearly trace-

able. The insertions of the supra and infra-spinatus, teres minor, and subscapularis, were perfect.

The perusal of these cases, and the manner in which, according to the pathological records before us, nature endeavours to remedy mischief, by causing the lower portion of the long head of the biceps to adhere to one or other of the lips of the bicipital groove; the complication of this lesion, with partial dislocation upwards and forwards, and the difficulty so frequently experienced of restraining the head of the bone in situ, in the latter accident, appear to me to throw considerable doubt upon the probability of effecting a perfect cure where the tendon of the biceps is ruptured, without more or less lesion of the functions of the part remaining. If, as Mr. Stanley has observed, the reparation of the injury must consist in the adhesion of the tendon to the head of the bone, and that the treatment of the case should be especially directed towards that result, it is very evident that the use of the bicipital tendon, as far as concerns the functions pointed out by Mr. Soden, "of opposing the capsular muscles of the joint, and keeping the head of the humerus away from the acromion process," must be very much impaired, if not entirely lost; and it would, therefore, appear most probable that the abutting of the greater tubercle of the humerus against the acromion process, and the consequent inability to raise the arm to any great extent, observed in Mr. Soden's case of dislocation, would always be present to a greater or less degree where the tendon is ruptured.

It certainly is a question worth considering, whether the cases of partial dislocation, in which, do what we may, we cannot prevent the head of the bone being drawn up again to its abnormal position, are not commonly, or always, complicated with rupture or displacement of the tendon of the biceps.

In Mr. Smith's cases, taken as they were from his dissecting room, his attention was first attracted by the unnatural appearance and signs of displacement which the joints presented, he having no previous knowledge of the individuals; and I believe this view of the case will be borne out by the pathological facts I have to relate to you in connection with the partial dislocations of the head of the humerus. Of the cases related by Mr. Stanley, two recovered; the third, although at the end of a month free from pain upon pressure, had not recovered the entire use of the muscle, and whether she ever entirely recovered the use of her limb is not stated by the author.

It is to be presumed, that in the cases related by Mr. Stanley, the head of the humerus remained in the glenoid cavity, without being unusually approximated to the coracoid or acromion process, as such an important symptom would scarcely have been unnoticed by so acute a surgeon and excellent an anatomist as that gentleman; we must also recollect that he had not the opportunity of examining his cases by dissection, and could therefore only conjecture the rupture of the tendon, whether entirely or partially he could have no means of ascertaining with any degree of certainty. A partial rupture would produce the same train of symptoms; and, moreover, a part remaining entire would prevent the undue elevation of the head of the bone, and thus account for complete recovery.

Treatment.—Your object in these cases should be to approximate the two portions of the tendon, to obtain

union if possible, or otherwise to favour the attachment of the lower portion to the head of the humerus, as Mr. Stanley has pointed out. To do this effectually, place the hand in the semi-supine position, that is with the thumb upwards, making your patient grasp the opposite shoulder; thus you effectually relax the biceps muscle, as you will at once perceive, upon recollecting that the biceps is inserted into the back of the tubercle of the radius, and that the first action of the muscle, when the hand is prone, is to render it supine before it can effect flexion of the elbow. Now apply a roller carefully, beginning from below, carrying it up to the axilla, and fixing a compress over the course of the biceps tendon, by which means you will keep the muscle quiet and prevent spasms; and, lastly, secure the arm in this position by bandages.

To enable me to complete the account of accidents to which the tendons of the biceps are liable, I will now relate the following case published by Sir G. Ballingall, in the 43d volume of the *Edinburgh Medical Journal*. It belongs to the section in which we shall treat of injuries about the elbow joint, but it is perhaps better that I should give it here, as you will then have together the different injuries to which this muscle is subject, and be thus enabled to contrast their various symptoms.

Mr. D., aged 50, a healthy man, whilst raising a heavy weight by the tips of the fingers of his right hand, suddenly felt a snap, accompanied by much pain in the lower part of the arm, a little above the elbow. The weight instantly dropped from his hand, and he was conscious of inability to use his arm as before. On trying to take off his coat, a few seconds after the accident, he experienced great difficulty, owing to the swelling of the arm. Upon examination, a large tumour was observed in the middle of the arm, occupying the seat of the belly of the biceps. Mr. D., (a great chemist,) considered this to be effusion, and therefore had a bandage applied, which almost entirely removed the pain, and enabled him to use his arm with comparatively little inconvenience. The next morning, Mr. D.'s son, a surgeon, examined the limb, and considered the swelling, which had increased, to be caused by retraction and swelling of the biceps muscle; in which opinion he was confirmed by finding that in the hollow which existed below the tumour, there could be detected a body, apparently the biceps tendon, which was loose above the extremity, and could be moved from one side to the other without difficulty. Bandages were now applied, consisting of two pieces of leather, accurately and tightly laced, one on the arm, the other on the forearm, with a strap passing from the lower to the upper piece of leather, for the purpose of keeping the arm bent; owing to the patient persisting in using his arm very much, the bandages could not be kept accurately applied, and after ten or fourteen days they were thrown aside. The tendon gradually contracted adhesions to the neighbouring parts. Although considerable swelling remained for a length of time, and also some difference in the form of the two arms, yet the patient could use his arm pretty well; but it was not so strong as formerly, and unequal to any great exertion.

He experienced pain and difficulty when he endeavoured to raise weights with the points of his fingers, and the power of pronation was much impeded. Sir

George Ballingall considered the tendon to have been torn from its insertion into the radius, and that flexion was performed by the brachialis anticus, and flexors of the carpus and fingers. Some defects existed eight months after the accident.

This case is decidedly interesting, but would have been much more so, had not the patient so obstinately opposed the endeavours of his surgeon, by persisting in using his arm; and we are deprived of the advantage of knowing what the result might have been, had he submitted to proper treatment. It does not appear that the methods employed were quite adapted to the urgency of the case; no restraint was placed upon the hand, and when we recollect how the biceps is inserted normally into the radius, how almost entirely the hand is connected with the latter bone, and moreover, that the radius is the movable bone of the forearm, it must be evident, that when the patient used his hand he moved the radius, and at the same time prevented the tendon uniting as favourably as it might otherwise have done.

The same line of treatment ought to be adopted in this case as in that of rupture of the long tendon of the biceps; only here you should commence your bandage at the shoulder and carry it down to the elbow, instead of beginning below and proceeding upwards, as I have there recommended. Be careful to place your patients hand upon his opposite shoulder, before applying the bandage; in other respects proceed in a similar manner.

In my last lecture I described Mr. Earle's apparatus for injuries about the shoulder, and also that modified by Mr. Chapman, and I then mentioned, that although well adapted for the purposes intended, they were liable to the objection of being very complicated and consequently very expensive, and moreover, that unless a surgeon living in the country had already provided himself with one upon the expectation of meeting with a case, much time would be lost before he could obtain it. To obviate these objections I have invented an apparatus, a modification—but a very simple modification of the late Mr. Earle's, and which has the advantage over that invented by the latter gentleman in being both simple and cheap, and one which can be made by any one who can stitch, in less than half an hour.

It consists of a long sleeve, made either of old sheeting or bed-ticking, which should be long enough to extend from the middle of the humerus to about three inches beyond the patient's fingers, and having, consequently, what (for the purposes of description) I shall call a humeral and a digital extremity, and also a hole corresponding to the olecranon to allow that process to project through. The digital extremity terminates in a *cul de sac*, or, in other words, is sewn up, and to it is attached a bandage three inches wide, made either of the same material as the sleeve, or of strong webbing, which is firmer and consequently better. This bandage should be at least three yards long, but you must be guided as to its length by the corpulence and size of your patient. To the posterior and external margin of the humeral extremity of the sleeve is attached another strap, from three quarters to a yard long, of the same width, and made of the same material. A pad for the axilla, made with bran, with a tape to pass round the patient's neck, completes the apparatus.

I will now show you the manner in which it is to be

applied: we will suppose that you have a fracture of the acromion process or of the neck of the scapula; in the former, as I have already told you, you should not place a pad in the axilla. In the latter, you must not only use the pad for the axilla, but also one between the elbow and the side, or one which, extending from the axilla to the elbow, will answer the purpose of both.

I first put the sleeve on the injured arm, with the elbow projecting through the opening made for that purpose, and then, bending the patient's forearm, place it horizontally across his chest. I carry the bandage from the digital end of the sleeve under the opposite arm, obliquely across the back, from below upwards over the front of the injured shoulder, without pressing upon the acromion process, under the opposite arm round the back under the elbow of the injured side, and pin the end to the band crossing the breast. I now carry the strap from the humeral end of the sleeve upwards across the back towards the opposite shoulder, and pin it up to the oblique band, by which the head of the bone is drawn upwards and backwards and completely supported against the acromion process.

Should the case be one of rupture of the bicipital tendon or fracture of the coracoid process, you employ the axillary pad, and apply the apparatus as follows:—Having put the patient's arm in the sleeve, you rest his hand on the shoulder of the opposite side, and carry the long bandage obliquely across the back, over the elbow of the injured side, and round the waist as often as it will go; pin it there, and support the elbow by carrying the short strap over to the sound shoulder and fasten it to the bandage encircling the waist.

You will observe that this apparatus is free from the objection urged by Mr. Chapman against that invented by Mr. Earle, as it leaves the motions of the sound shoulder entirely free and unimpeded, and the seat of injury uncovered, enabling you to watch the state of parts, without the necessity of disturbing the apparatus.

Since my last lecture, Mr. Houlton, our House Surgeon, called my attention to an out-patient, who had fallen down upon her left shoulder. She experienced great pain at the time, but could move the limb and raise the arm to her head when she applied to him immediately after the accident, two days previously. As, however, the arm had become motionless, and she complained of so much pain, he requested me to examine her. She told me that when she attempted to move or bend her arm she suffered greatly, especially in the course of the belly and long tendon of the biceps muscle. I desired her to raise her arm to her head, but although she endeavoured to do so she could not, and complained greatly of the pain which the attempt caused her, but at the same time the pain was confined entirely to the situation of the biceps. I examined the arm very carefully, and could detect neither fracture nor dislocation, but upon tracing up the tendon of the biceps in the axilla, I found it more prominent than natural, and evidently thrown inwards upon the inner tubercle, whilst pressure upon it gave her pain as she experienced when the arm was moved, I therefore decided that the case was one of displacement of the tendon of the long head of the biceps, and I accordingly rotated the arm strongly inwards, at the same time giving the elbow a sweep from below upwards,

across the chest, by which means the tendon was returned to its natural position, and upon my now requesting the patient to raise her arm to her head, she did so with perfect facility and without complaining of any pain.

A CRITICAL ANALYSIS OF THE PRINCIPAL FACTS OF DISEASE.

In this paper I propose to make a critical analysis of the principal facts of irritation and congestion, as antecedent phenomena of inflammation. Subsequently, in other papers, I design to treat in the same manner the facts of inflammation, fever, &c. The principles of treatment will likewise be examined, and their value tested physiologically.

Time is not mis-spent in trying to improve the basis of medical practice by the study of, and search after, principles, and by the endeavour to make them fruitful in the exercise of the healing art.

H.

IRRITATION AND CONGESTION.

I. *The word irritation is made use of to express states of the nervous system, or its parts, known only by their effects.* This is a self-evident proposition, and is founded merely on the conventional use of the word *irritation*, in the language of medical science.

II. *The antecedents of these states (1.) may be mental excitement; the application of a stimulant; an injury; or the equivalents of these.*

Mental excitement, as an irritant of nerves, excites pallor, or the blush, or both, in capillaries acting in concert with them.

This is the simplest instance of sensation acting upon the velocity of the circulation in a part. Its effects are transitory; but an injury continues, therefore its effects are persistent.

III. *Irritation varies in its effects according to the character of its antecedents (II.), its situations, and relations.*

Dubois has remarked ("Préleçons de Pathologie Expérimentale") that cessation of circulation precedes increase in its velocity, after a puncture in the web of the frog's foot. Thompson made the same remark. ("Traité de l'Inflammation." French edition.)

Pallor and the blush, cessation and increased velocity of the circulation; these opposite effects are produced by different degrees of the same state of the nervous system. The same injury (Dubois) gives rise, locally, to arrest of the circulation, and to subsequent increase in its velocity; the same idea to the blanched and crimsoned cheek. Ammonia causes the circulation to be less rapid, (Thompson,) but its action is probably chemical (Müller,) and therefore its effects, which differ remarkably, are not to be relied on. The same observation may apply to other stimulants, in the present imperfect state of knowledge in the matter.

IV. *Irritation may be both normal and abnormal.*

This and the preceding proposition embrace all the varieties of *irritation*, in whatever structure they may arise, under whatever circumstances they may subsist, and by whatever agency they may have been excited. Their development is reserved for the opportunity

when the facts on which they are based call for full elucidation.

V. *Irritation is normal when its effects are brought about by a natural cause, or its equivalent, and which disappear soon after the cause is removed (III. IV.); abnormal when its effects are persistent, owing to the permanence of its cause (II. III.).*

VI. *When irritation is normal (V.) and is excited in a vascular structure (III.), it is followed by increase in the velocity, sometimes preceded by arrest of the circulation of the part (II.).*

VII. *When irritation is abnormal (V.) and occurs in a vascular part, there is a temporary cessation succeeded by preternatural velocity of the circulation (VI.); the diameter of the capillaries is lessened; the usual change in the blood, from arterial to venous, does not take place within them; the blood globules coalesce, and secretion is suspended.*

Normal and abnormal irritation produce the same functional disturbance in the capillaries; but, if the irritant action continue beyond a certain period, the characteristic phenomena of congestion become developed. Under whatever circumstances an arrest of the circulation precedes an increase in its velocity, the diameter of the capillaries must be lessened, for these vessels collapse when empty, and the force of the heart has to overcome gradually the resistance made to it by firmly closed tubes. It is probable that a local increase in the velocity of capillary circulation, is always preceded by a partial emptying, and, consequently by a reduction in the diameter of the vessels. The force of the heart being in an inverse ratio to the diameter of the vessels, it follows, that a decrease in the diameter of the capillary tubes must be succeeded by an increase in the velocity of the circulation.

The presence of irritation implies the presence of nervous matter (1.) "The retina affords the most striking demonstration of the general termination of a nerve, and does it in a manner so satisfactory, that little further can be desired; and it gives ample reason for concluding that the rest have a similar but modified termination. Although many of the nerves may be traced to form a membranous expansion, yet these are so small in proportion to, and so much interwoven with, their respective organs, as to leave the anatomist incapable of demonstrating to the same degree their ultimate termination." (Swan, "A Demonstration of the Nerves of the Human body.")

The connection which exists between the nervous and capillary systems cannot be established by minute anatomy. But the sensibility manifested by animals when the intercapillary spaces are punctured, and the disturbance which ensues in the circulation of the part, demonstrate with the utmost certainty that such a union subsists. The severing of the nerves of sensation at their roots, destroys all sensibility in the intercapillary spaces, and a puncture made within them then no longer affects the circulation.

The left limb of a frog having been deprived of sensation and motion, by an injury of the spinal cord at the loins, the circulation was examined immediately in the webs of both feet, and the following results were noted:—

Most of the capillaries in the paralysed limb were empty and invisible. Here and there one or two