A probationary surgical essay on dislocation of the shoulder joint : submitted,... to the examination of the Royal College of Surgeons of Edinburgh,... / by John William Turner. October 1812.

A

PROBATIONARY

SURGICAL ESSAY

ON

DISLOCATION

OF THE

SHOULDER JOINT;

SUBMITTED,

BY AUTHORITY OF THE PRESIDENT AND HIS COUNCIL,

TO THE EXAMINATION OF THE

Royal College of Surgeons of Edinburgh,

WHEN CANDIDATE

FOR ADMISSION INTO THEIR CORPORATION,

IN CONFORMITY

TO THEIR REGULATIONS RESPECTING THE ADMISSION

OF

ORDINARY MEMBERS.

BY

JOHN WILLIAM TURNER.

OCTOBER 1812.

EDINBURGH:

PRINTED BY JAMES BALLANTYNE AND CO.

1812.

PROBATIONARY

SURGICAL ESSAY

ON

DISLOCATION

OF THE

SHOULDER-JOINT.

SUBMITTED BY THE ROYAL

COLLEGE OF SURGEONS

BY AUTHORITY OF THE PRESIDENT AND HIS COUNCIL,

AND READ TO THE MEMBERS OF THE SOCIETY IN THE

Royal College of Surgeons of Edinburgh,

WHEN CANDIDATE

FOR ADMISSION INTO THEIR CORPORATION,

IN CONFORMITY

TO THEIR REGULATIONS RESPECTING THIS ADMISSION

AND DESIGNED TO

ORDINARY MEMBERS.

BY THE AUTHOR,

JOHN WILLIAM TURNER.

EDINBURGH:

PRINTED BY JAMES ANDERSON AND CO.

1818.

TO

JOHN THOMSON, M. D. F. R. S. E.

PROFESSOR OF SURGERY TO THE ROYAL

COLLEGE OF SURGEONS,

AND REGIUS PROFESSOR OF MILITARY SURGERY IN THE

UNIVERSITY OF EDINBURGH,

THIS ESSAY

IS RESPECTFULLY INSCRIBED,

AS A TESTIMONY OF

THE GRATITUDE AND AFFECTION

OF HIS PUPIL,

THE AUTHOR.

ESSAY

ON

DISLOCATION OF THE SHOULDER JOINT.

In perusing the writings of surgical authors on the subject of dislocation of the shoulder joint, we find that their opinions and statements are, in general, discordant, and sometimes contradictory; and although, in most instances, this want of coincidence may exist in appearance only, and arise from the inaccuracy and promiscuous use of the terms, by which they have described and denominated the various kinds of this accident, yet it sometimes happens, that opinions essentially different, with regard both to the history and treatment of these accidents, are advanced, and supported by arguments and examples deduced from actual experience. Hence we learn, that it is only by examining accurately, how far such opinions and statements coincide or disagree with cases of dislocation, and with the circumstances dependent on the structure of the parts concerned, that accurate and consistent views on this subject may be expected.

Prompted, therefore, by a desire of gaining information, and considering that the method of imitating the dislocations on the dissected joint, which has been already so successfully applied in elucidating the nature and treatment of dislocation of the thigh bone, might also in this be employed with material advantage, I endeavoured, a short time since, to investigate in that manner the dislocations of the shoulder; supplying, as much as in my power, the want of experience by an accurate attention to the cases on record. In prosecuting this object, I have derived much information from the treatise of Professor Bonn of Amsterdam on luxated humerus; and for the description of individual cases, I have been much indebted to the works of Desault.

It is entirely unnecessary, and it would be inconsistent with the plan and limits of this Essay, to enter into a detailed description of the anatomy of the shoulder joint, or of all the circumstances attending its dislocation. It is, therefore, my intention, merely to give some account of the different kinds of dislocation of the shoulder, and of the methods proposed for their reduction; premising only such general observations on these accidents, as may be necessary to prevent repetition in the subsequent part of the Essay.

GENERAL REMARKS.

It has been a prevalent opinion among surgical authors, that from the structure of the shoulder joint, there are certain parts of the glenoid cavity from which the head of the humerus cannot escape; that dislocation can only take place in certain positions of the arm; and that violence applied in a particular manner only can produce dislocation of the shoulder; and from such opinions deductions have been made, with regard both to the pathology and treatment of these accidents. An examination of the anatomy of the parts, and the recorded experience of surgeons, sufficiently prove the incorrectness of these views. Nevertheless, it is true, that the joint is more strongly supported in some situations than in others; that certain positions of the arm are more favourable to dislocation than others; and that in certain directions the displacing force is more readily applied.

In all dislocations of the humerus, the soft parts composing and surrounding the joint must be much displaced and injured.

The capsular ligament must, in every instance, be either altogether detached or extensively lacerated, before the head of the humerus can pass over the edge of the glenoid cavity. This may be presumed from the examination of the joint in the dead body, and has been found to be the case in all the dissections of dislocated humerus which have been mentioned by surgical authors.

The state of the muscles arising from the scapula, and attached to the arm, must be changed, more particularly of those inserted with the capsular ligament immediately round the head of the humerus. There is reason to believe, that these are in every instance more or less lacerated; and, if not lacerated, they must certainly be otherwise much deranged. The muscles on the same side of the scapula which the dislocated humerus occupies are detached from the subjacent parts, and pushed from their situation, while those on the opposite side are much stretched, and have their directions altered.

The part of the capsule which is not lacerated, and the muscles which remain attached, will strongly retain the head of the bone near the glenoid cavity. The more entire these parts re-

main, the more constrained must be the head of the humerus; consequently, in recent dislocation, the freer its motions, the greater may be supposed the laceration of the surrounding parts; an obvious inference, of considerable importance in forming an opinion in such injuries.

Symptoms of Dislocation of the Shoulder.

Dislocation of the shoulder is indicated by a deformity of the joint suddenly produced, a hollowness being perceived in the situation which the head of the humerus naturally occupies, and an unusual tumour in its new place. The direction of the humerus is altered, and certain motions of the arm are rendered impossible. The patient cannot produce any extensive motion of the arm by his own effort; and if the arm is raised, has no power of retaining it in that position, from the loss of the fulcrum to the humerus.*

Difference between the length of the dislocated and sound arm has been generally mentioned as a mark of dislocation. This can seldom be great, and, in all instances, must depend very much on the po-

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* Turner's Surgery, vol. ii. p. 210.

sition of the arm when the measurement is taken. In all dislocations of the humerus, if the arm be raised to a horizontal position, there must exist a shortening, from the head of the humerus being placed beyond the margin of the glenoid cavity.

When a dislocation is not reduced, the head of the humerus contracts adhesions with the surrounding parts, and generally forms to itself a new cavity in the scapula. The soft parts accommodating themselves to their new situation, the arm acquires a certain extent and power of motion, and the other symptoms also become less evident.

Of the Cure of Dislocation of the Shoulder Joint.

In order to understand the most advantageous manner of attempting the reduction of a dislocation, it becomes necessary to be aware of the obstacles to be encountered, and dangers to be dreaded, in its accomplishment, so that the means employed, may be calculated to overcome the one and avoid the other. It is here that a minute knowledge of the state of the deranged parts becomes useful, and it is to direct our practice, that we should endeavour to trace the connexion between the external symptoms and the situation of the parts which are concealed from

our view. This can only be done by attending minutely to the history and appearance of cases, and comparing them with dissections and imitations of dislocations.

In the reduction of a dislocation, the objects to be attained are the removal of the head of the humerus from its new situation, and the replacement of it in the glenoid cavity.

The obstacles to this may be stated to arise,

1*st*, From the relative position and shape of the hard parts.

2*dly*, From the soft parts connected with the head of the bone, retaining it in its new situation, more particularly the muscles in a state of contraction.

3*dly*, From the intervention of soft parts between the head of the bone and glenoid cavity, preventing its re-entrance.

4*thly*, From the attachments to the surrounding parts which have been formed in cases of long duration.

In attempting to overcome these obstacles, the dangers to be avoided are,

1*st*, The fracture, or injury, of the hard parts.

2*d*, The laceration, or contusion, of the soft parts.

3d, The infliction of pain.

The obstacles to reduction exist in every case, in a greater or less degree, though they vary considerably in the different kinds of dislocation, or even in different cases of the same kind. Those from the first and second causes exist in every instance, and when those from the other two are present, they are combined with the former.

It must be immediately perceived from the above enumeration, and it will become still more evident on examining particular cases of dislocation, that the means to overcome one obstacle, may not be best calculated to overcome another, and that they are even, in many instances, of an opposite nature. Here it becomes necessary to attend to the obstacle of the greater importance. It must also be obvious, that it will be impossible, in any case, altogether to avoid the dangers which have been pointed out: For, in attempts at reduction, more or less pain must always be caused, and a certain degree of injury done to the parts concerned. In cases of long standing, the laceration of the adhesions is the first step necessary in the operation.

The older surgeons always applied the extending and counter-extending powers to the dislocated bones. This practice is also recommended by

Petit and Duverney, and has been, to the present time, followed by almost all surgeons of this country. Fabre and Dupoui, two French surgeons, observing the disadvantages which might arise, and often do arise, from the pressure of girths on the muscles passing over the joint, recommended, that the extending and counter-extending powers should not be applied to the dislocated bones themselves, but to those with which they are articulated,—a rule which has since been laid down by Desault and Boyer, and adopted by most French surgeons. About the same time, Portal, having had occasion to see injurious effects produced by the use of machines and the application of girths, and having failed in effecting reduction with a machine of his own invention, was led to adopt an opinion unfavourable to all machines, and even to proscribe the application of girths.

The promulgation of these opinions gave rise at the time to a discussion, by no means remarkable for accuracy of statement, or ingenuity of argument, but from which considerable improvement in the practice in dislocations has been derived. *

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* See papers in the Journal de Medicine, vol. xxvi. xxvii. xxviii. by Dupoui, Aubrai, and Portal.

That the application of girths does not produce such great or such frequent injury as is stated by Portal, experience sufficiently testifies; though there is no doubt, that it is sometimes attended with disadvantages. Girths occasionally produce inflammation and abrasion of the integuments when much force is applied; a consequence which is often unavoidable. When applied over muscles which pass over the dislocated joint, they, by their pressure, constrain and irritate them to contraction, and thus impede reduction: yet often without their application the replacement of the bone is impossible. The objections are particularly strong to the application, under the arm-pit, of girths for producing counter-extension, on account of their compressing and shortening the pectoralis, latissimus dorsi, and teres major muscles, and in this way preventing the motions of the arm, and often hindering the extension necessary for reduction; effects which have been well delineated by Portal, in a figure accompanying his Essay.* The application of girths to that part, however, cannot always be dispensed with, though perhaps they are applied there more frequently than necessary. In many instances, a sufficient degree of counter-

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* Journal de Medicine, vol. xxviii.

extension may be produced by the body retained by its own weight, by a broad towel passed round it so as not to compress the muscles bounding the axilla, or by a force applied to the sound arm; the clavicle, and muscles attached to the scapula, preventing that bone from following the humerus. In some cases, particularly those of long standing, where the head of the humerus is firmly fixed in its new situation, the extending force applied may act in stretching the parts which attach the scapula to the trunk, instead of detaching the humerus from its unnatural position. It, therefore, becomes necessary to retain the scapula by girths passed over it. These should be applied in the manner that is the least likely to prove injurious. Their bad effects are diminished the more horizontally they are applied, and by the intervention of a cushion in the arm-pit, which prevents their pressure on the edges of the muscles.

By applying the extending power at the wrist in reducing dislocations of the humerus, the pressure on the muscles passing from the shoulder over the arm is avoided, and the advantage of a greater length of lever sometimes obtained: but in many instances there are circumstances which entirely counterbalance these advantages, and render the practice highly injurious. The fore-arm is often in a state of flexion from the biceps being stretch-

ed; in this case, the extending force applied at the wrist will act merely in stretching that muscle still more, and will rather impede than assist reduction. If the extension be applied at the wrist, in cases where much force is required to detach the head of the humerus, that, or the elbow joint, may be sprained or otherwise injured, before the desired effect on the shoulder is produced. In such cases, the application of the girths above the elbow, even with the disadvantages stated, is the preferable practice; but where such difficulties or dangers do not exist, the extension at the wrist may be advantageously used.

The cure of dislocations which have remained long unreduced is always difficult, and frequently impossible. In strong muscular patients, and in cases in which spasmodic contraction exists, it often requires considerable force to bring the head of the bone to the edge of the glenoid cavity. In such cases continued extension, by inducing fatigue of the muscles, has been found to produce the desired effect with safety to the patient. This practice has been recommended and followed by David and others in reduction of dislocations of the shoulder.*

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* Boyer. Maladies des Os. vol. ii. p. 33.

In all attempts at reduction, the least possible force should be employed; to insure this, its increase should be gradual and cautious. In cases where strong adhesions have formed, they may be torn, by moving the arm in different directions with the power of a lever. In doing this, care should be taken not to cause motion in such a direction as may lacerate muscles already stretched by the situation of the humerus.

It has been supposed, that difficulty in reduction sometimes occurs, from the aperture in the lacerated capsule contracting round the neck of the humerus, and becoming too small to permit it to re-enter its cavity; in the same manner as a stricture is formed round a portion of bone by the integuments through which it protrudes. But of the truth of this opinion there is no proof. Desault seems to have adopted it from being unable to explain the difficulty of reduction, in some cases in which the head of the humerus, after being brought over the edge of the glenoid cavity, could not be made to enter its joint. Suspecting the narrowness of the aperture in the capsule to be the cause, he supposed, that by making the arm perform extensive motions in every direction, he might increase the laceration. The success of this practice confirm-

ed him in his opinion.* But the inelastic nature of the capsular ligament, the extensive laceration which it must suffer in every case, and a great part of the circumference of the aperture being formed by the bone from which it has been torn, † are strong presumptions against the existence of such a state. Moreover, from the symptom by which Desault considered this state to be indicated, (the mobility of the head of the humerus,‡) and from several circumstances mentioned in the history of the cases in which it is supposed to have existed, there appears reason to believe that a greater rather than a less degree of laceration of the surrounding parts had been produced. At all events, the propriety of the practice, by which Desault has proposed to overcome this difficulty, is doubtful; and it is certainly one which might often be productive of mischief.

When the dislocation is reduced, the subsequent treatment is in general very simple, consisting merely in keeping the arm in one position,

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* Desault. Journal de Chirurgie, vol. ii. p. 137, 142, 169. Œuvres Chirurgicales, vol. i. p. 371.

† Kirkland's Observations on Mr Pott's Remarks on Fractures, &c. App. p. 17, *et seq.*

‡ Desault's Œuvres Chirurgicales, p. 350.

and counteracting, by the usual means, any consequent inflammation. In some cases, however, the humerus is very liable to slip again out of its cavity. This may arise from a portion of the glenoid cavity being broken off, which is by no means an unfrequent accident, though it is not very easily detected. The rupture of the tendons of the muscles attached round the articulating surface of the humerus, which are the principal agents in retaining the head of that bone in its cavity, will render it liable to be again displaced. It is worthy of remark, that, in many of the cases on record, in which extensive motions were performed with the dislocated arm, the joint had, for some time after reduction, a strong tendency to dislocation; and it required considerable attention to keep the head of the humerus in its place.

DISLOCATION UPWARDS.

The joint of the shoulder is supported at its superior part, by the acromion and coracoid processes, by the extremity of the clavicle, and ligaments connecting these parts, by the deltoid muscle, the supraspinatus, and long tendon of the biceps. But it is easy to conceive, that the

arm placed by the side may be impelled upwards by a blow or a fall, with a force sufficient to produce a displacement of the humerus from its joint. It would appear, however, that this dislocation cannot take place without fracture of one or both processes of the scapula, because there is not sufficient space between them to permit the passage of the head of the humerus,* and because the trunk of the body will prevent the elbow from being placed far enough inwards to direct it over their extremities. The rupture of the tendon of the biceps must also be a necessary consequence of this injury.

Of the dislocation upwards there appears to be no example on record, and its occurrence has been considered by many authors to be impossible. But for this opinion there does not appear to be sufficient grounds; though, from the manner in which the requisite force must be applied, and from the strength of the resistances, it must necessarily be extremely rare. That no case of it, however, should be recorded rather affords room for surprise. It may, perhaps, be explained by the tendency which such a dislocation would have to spontaneous reduc-

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* Camper. Demonstrat. Anatom. Pathol. p. 4. § 14.

tion; a circumstance which has been hinted at by Galen,* and is particularly mentioned by Du Verney: "Nevertheless," says this author, "that the head of the bone may quit its cavity in this direction, the resistances must be overcome, which cannot be effected without shivering the bone; but then the portion of the acromion, for instance, that has been fractured, obeying the contraction of the deltoid, and other muscles that are attached to it, and assisted by the weight of the arm, the bone frequently re-enters of itself into its natural place, *as has been often seen.*" †

Supposing the existence of such a dislocation, it is easy to conceive the symptoms which must attend it; a tumour will be formed on the top of the shoulder by the head of the humerus and fractured portions of the scapula. The arm will be directed along the side and shortened, a part of the body of the humerus passing over the glenoid cavity. Motion in every direction will be rendered impossible, or extremely limited. When the dislocation has taken place, and has been spontaneously reduced, the appearances will be

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* Vidus Vidius, p. 217.

† Du Verney on Diseases of Bones, translated by Ingham, p. 229.

simply those of fractured acromion and coracoid processes, with injury of the joint and surrounding parts.

This dislocation has properly received the denomination of dislocation upwards from most authors. Bonn has supposed that Hippocrates applied to it the term *forwards;* a conjecture which seems to be borne out by the expressions of the Father of Medicine.* Ambrose Paree has also described it under the term *forwards,* but in an inaccurate and rather unintelligible manner.†

The reduction of this dislocation may be effected by drawing the arm downwards, at the same time that the head of the humerus is pressed a little outwards, so as to prevent its being entangled and checked by the fractured extremities of the coracoid and acromion processes. The after treatment should consist in placing the arm in such a position as to relax as much as possible the injured parts, and facilitate the re-union of the fractured bones. This will be best accomplished by laying the arm nearly at a right angle with the body. Inflammation and tension are to be kept

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* Bonn, de Humero Luxato Commentatio. Amst. 1782. V. Vidius, 217.

† Ambrose Paree, Opera Chirurgica. Guillemeau's edit. p. 451.

down by the usual means. The same treatment is to be adopted in cases in which spontaneous reduction has taken place.

DISLOCATION DOWNWARDS.

When the arm is raised in abduction, the inferior part of the capsular ligament is stretched; and if this motion be continued beyond a certain extent, a laceration must take place. This is one of the most frequent violences to which the arm is liable; and is one in which the displacing force acts with the advantage of a long lever, turning the head of the humerus out of the glenoid cavity. From the position which the humerus occupies when the capsule is thus lacerated, all the muscles attached to that bone will contribute their aid in removing its head from the joint. The capsule may also be stretched and lacerated by blows applied at the superior part of the humerus, forcing it downwards, as by falls on the top of the shoulder, or weights striking against it.

At the inferior part of the joint there is a considerable space between the edges of the tendons of the subscapularis and teres minor muscles, which is inclosed by synovial capsule alone. The edge of the long head of the triceps muscle, which

is inserted into that portion of the anterior costa of the scapula immediately contiguous to the brim of the glenoid cavity, passes through this space; but, from its thinness, the portion of the joint which it supports is very small. From these circumstances this part of the joint is weaker than any other, and the forces which impel the head of the humerus against it are the most easily and most powerfully applied. We should, therefore, *a priori*, conceive, that the head of the humerus will most frequently escape through that part; a conclusion which is found to accord with experience.

If the head of the humerus forced through this part be impelled with sufficient violence against the edge of the triceps, which when the arm is raised must be stretched, a portion of that muscle may be torn from its insertion; and, on the arm falling down, the head of the humerus may rest on the edge of the scapula from which the triceps has been detached. Such a dislocation must necessarily be extremely rare, from the difficulty which exists in impelling the head of the humerus exactly against the edge of the triceps, and from the great force necessary to detach that muscle. The narrowness of the costa of the scapula, and the spherical shape and smooth surface of the head of the humerus in

contact with it, must render the permanency of such a dislocation very precarious; more especially from the great power which the adductor muscles will have, when they act, of drawing that bone to the anterior surface of the scapula. If, instead of detaching the triceps, the head of the humerus merely pushes it back, and rests upon it, its situation will be momentary only, as the first contraction of the muscle must throw it off.

A description of the dislocation downwards has been given by Petit, which appears to have been copied by several succeeding authors. By late authors it seems to have been overlooked or misunderstood. No case of it, however, is related or referred to by those who have described it.

In this dislocation, it is stated by Petit, that the arm is longer than natural, the fore-arm stretched, and the whole arm a little raised. The patient is in pain when the arm is bent down, and finds ease when it is a little raised. It puts him to torment when one bends the cubitus, and he is relieved on stretching it out. Pain is felt from the scapula to the elbow, in the course of the long head of the triceps.*

When the head of the humerus is forced out of the joint by the forcible abduction of the arm, the

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* Petit Maladies des Os. edit. par Louis, vol. i.

insertions of the subscapularis and teres minor muscles must be torn for a considerable distance, there not being otherwise sufficient space for its exit between them. It would appear likewise, from the examination of the parts, that when the head of the humerus is forcibly driven downwards while the arm is placed near the side, the superior part of the capsule and supraspinatus muscle must necessarily be lacerated before the bone can escape over the edge of the glenoid cavity.

In dislocation downwards that part of the triceps which remains attached to the scapula must be violently stretched; a circumstance which will occasion the extension of the fore-arm, and prevent the arm from being raised horizontally. When the muscles which elevate the arm, and superior part of the capsular ligament are not detached from the humerus, they will be violently distended over the glenoid cavity, and prevent the elbow from being pressed to the side. Indeed, from the position of the humerus, all the muscles attached to it which arise from the scapula, must be stretched, which will cause every attempt at motion to be attended with pain and difficulty. The position of the head of the humerus so much lower than natural, and the extended state of the deltoid muscle must produce a sudden bend

of the arm, at the insertion of that muscle, above which the parts will feel soft from the removal of the bone. The elbow will neither be thrown backwards nor forwards; and on examination the head of the bone may be felt from the posterior part of the shoulder, under the edge of the deltoid muscle, as well as from the axilla.

In the reduction, we must endeavour to carry the head of the humerus outwards over the edge of the glenoid cavity, which is in general nearly on a level with the costa of the scapula, and which therefore opposes little resistance to this motion. But, from the stretched state of the muscles pressing the head of the bone against the edge of the scapula, there may be some difficulty in moving it from its position. Extension should be applied in order to diminish this pressure, and to prevent the head of the humerus from slipping off the edge of the scapula instead of entering its cavity.

The girths should in this case be applied over the wrist, as we shall thus avoid pressing on the stretched triceps. The arm should be so placed, that the muscles may be as nearly as possible in an equal degree of tension, it being impossible, in this dislocation, to produce a relaxation of them all by any position of the limb. The greater degree of

tension of the muscles elevating the humerus which is caused by the weight of the arm, will be relieved by moving the elbow a little from the side, the posture in which the patient in this dislocation enjoys most ease. Extension is to be made in the direction of the arm thus placed, so as to disengage the head of the humerus a little from the edge of the scapula, while, with the hands passed into the axilla, it is to be lifted outwards beyond the margin of the glenoid cavity. The extension is now to be intermitted, and the action of the muscles attached to the humerus will complete the reduction. Except in the application of the girths to the wrist, these directions correspond exactly with those given by Petit for the reduction, which he says is an easy operation. He applied the extension by means of his machine for reducing luxations of the humerus.

DISLOCATIONS TO THE ANTERIOR SURFACE OF THE SCAPULA.

I. *Dislocation downwards and forwards.*

When, by the same means as in the last described dislocation, the capsular ligament is lacerated at its inferior part, if the head of the hume-

rus be not forced exactly against the edge of the triceps, but more anteriorly, it may slip over the margin of the glenoid cavity, and lodge on the anterior and inferior part of the cervix of the scapula, under the subscapularis muscle. To this dislocation there is less resistance from the structure of the parts than to any other, and the injuries producing it are the most frequent; accordingly, the cases of it are more numerous than of any other of the dislocations of the humerus, so much so indeed, that some authors, with Hippocrates, have considered it as the only primary dislocation of the shoulder which occurs. In this dislocation the head of the humerus is generally described to be situated in the axilla; but from examination of preparations of dislocated shoulders which had not been reduced, and from experiment, by producing dislocation on the dead body, Bonn was led to conclude, that it occupies the situation above described, a conclusion which is confirmed both by the external appearances in this dislocation, and by dissection of the shoulder. *

In this dislocation, the arm is a little lengthened; its direction is more obliquely outwards than

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* Bonn, de Humero Luxato.

natural, and a little backwards. The shoulder loses its roundness, the acromion projects, and an unusual hollow is perceived in the situation of the joint; on running the fingers along the external part of the arm, the hardness communicated in the natural state from the bone in its whole length, is only felt from its middle to the elbow. The soft parts above, no longer sustained by the bone, yield to the hand in every direction; a resisting and hard tumour formed by the head of the humerus, is felt by the hand placed in the arm-pit. The motions of the arm are much impaired; that of circumduction is impossible, nor can the patient carry his hand upwards and forwards, so as to put it to his forehead. The fore-arm is sometimes in a state of flexion, and pain is produced by attempts to extend it. Any attempt to press the elbow to the side, gives the most severe pain, and even the weight of the arm producing this effect causes great uneasiness; to avoid this, the patient leans towards the affected side with the fore-arm in a bent position, and rests it upon the thigh as a support. By this attitude alone, Desault was enabled to distinguish this dislocation at first sight, very rarely being deceived in it.*

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* Desault. Œuvres Chirurgicales, edit. par Bichat, vol. i.

On placing the head of the humerus in the dissected joint, on the anterior and inferior part of the cervix of the scapula, appearances similar to those which indicate the existence of this dislocation in the living body, were produced, and an explanation of them afforded. In this situation, the muscles which elevate the arm in abduction, were much stretched, particularly the supraspinatus, and the portion of the capsule which remained entire was in a state of tension bordering on laceration. These parts retained the head of the humerus firmly under the edge of the glenoid cavity, which projected into the angle between the articulating surface of the humerus and soft parts inserted round it, forming a septum between the cavity of the joint and head of the humerus. The abduction of the arm, and difficulty of bringing the elbow to the side, were occasioned by the stretched state of the abductor muscles. The muscles from the posterior surface of the scapula were firmly stretched across the joint, and would effectually have prevented any rotation inwards: this, together with the situation of the bone under the subscapularis, and the stretched state of the posterior portion of the deltoid, sufficiently explain the difficulty of motion backwards and forwards. The head of the humerus is situated farther downwards than when in

the glenoid cavity, (its *superior* part being placed nearly opposite to the middle of that cavity,) and more anteriorly; the arm is therefore, when directed downwards, somewhat lengthened, and the elbow thrown a little backwards. The lengthening of the arm, and increased curvature of the head of the biceps when it remains in its groove, will cause an elongation of that muscle, and a consequent flexion of the fore-arm. The extent to which the motion of abduction is permitted in this dislocation, is not distinctly stated by surgical authors. From examination of the dissected joint there appears no obstacle to this movement, and no muscle or ligament which will be injured by it. In some cases, it seems to have been possible to perform it with little difficulty, except that which arises from the infliction of pain. The directions which are given by some surgeons for the method of reduction, seem also to indicate the possibility of placing the arm at a right angle with the body.

The description of the situation of the head of the humerus in this dislocation given by Boyer, is not sufficiently accurate; he describes it as being placed "entre le bord anterieur du sous-scapulaire en avant, et la tendon de la longue portion du triceps en arriere." From what has been already said, it is evident, that the head of the

humerus is situated higher up than the edge of the scapula, and that its posterior part rests on the cervix of that bone; were it otherwise, and the head of the bone placed on the anterior surface of the triceps, the arm would be much more lengthened than it really is in this dislocation, and the triceps would be kept in a state of tension that would prevent the flexion of the forearm.

This dislocation is in general primary; but it may in some instances be secondary, succeeding to dislocation directly downwards.

The term dislocation into the axilla is that which is generally applied to it, as also dislocation downwards. By some, it is properly denominated dislocation downwards and forwards.

In the cases in which the head of the bone is driven from the glenoid cavity, into the subscapular fossa, the capsular ligament must be entirely torn away, and the supraspinatus, infraspinatus, and teres minor muscles lacerated.

Various methods of reducing this dislocation have been proposed. Such of these as act, by merely pushing the head of the humerus outwards, towards the glenoid cavity, must often be ineffectual, from the intervention of the edge of that cavity, and from the resistance that the muscles

which elevate the arm, and the superior portion of the capsular ligament will produce. They are also objectionable, from the injury they are likely to inflict on these parts, when great force is used; which must always be the case when the arm is employed as a lever in producing it. It is in this manner that the common and ancient method of pushing the elbow towards the side while a resistance is placed under the superior part of the arm, produces its effect, as in the reduction by the ambi of Hippocrates, by means of the ladder, and by the other methods recorded by that author.

There is an evident necessity for removing the head of the humerus from its situation, so as to lift it over the edge of the glenoid cavity. To perform this, it is necessary to counteract as much as possible, by position and extension, the power of the stretched parts and contraction of the subscapularis, which retain the head of the bone in its new situation.

Boyer, following a general rule which he has laid down, of always performing the extension in the direction the dislocated bone has assumed, directs the extension to be made outwards and downwards, till the head of the humerus is brought beyond the edge of the glenoid cavity; and that the head of the humerus be then to be carried out-

wards, by placing the hand under the superior part of the arm, while the elbow is brought to the side.*

In bringing down the head of the humerus beyond the edge of the glenoid cavity, by extension in the direction recommended by Boyer, it is conceived that great resistance must be experienced from the superior part of the capsular ligament and supraspinatus muscle, which, from their already stretched state, can ill bear to be farther elongated. But, supposing these parts to be extended so as to permit the head of the bone to pass the edge of the glenoid cavity, they must strongly oppose the subsequent motion outwards which is necessary for the reduction, and must incur great risk of laceration in the progress of the operation.

By elevating the arm to a right angle with the body, the tension of the muscles which produce elevation, and of the part of the capsular ligament which is attached to the superior part of the joint, will be considerably relieved. By this position also, the head of the humerus will be depressed below the projecting edge of the glenoid cavity, and its articulating surface brought to the margin of the joint; in some cases this is all

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* Maladies des Os. ii. p. 90.

that is required to permit the replacement, by the action of the muscles which are inserted round the head of the humerus.* But, in general, even when the arm is brought into this position, the head of the humerus will be retained beyond the edge of the glenoid cavity, by the action of the subscapularis muscle. This resistance is to be overcome by extension applied to the arm in the elevated position, which will move the head of the bone directly towards its natural situation. It has been supposed that resistance may be produced from the head of the humerus locking behind the edge of the glenoid cavity. But from the shape of the head of the humerus, and from the manner in which the capsule and tendons are inserted round its articulating surface, we should be disposed to consider this as a rare occurrence when the arm is placed at a right angle with the body. When it is supposed to exist, it may be obviated by pressing down the superior part of the humerus, thus bearing it off from the edge of the glenoid cavity, as has been recommended by Bonn ;† or it may be diminished by increasing the elevation of the arm so as to turn down the head of the humerus.

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* Hey's Practical Observations in Surgery.

† Bonn, de Humero Luxato, p. 56.

When by proper extension, assisted by these means, the articulating surface of the humerus is brought on a level with the edge of the glenoid cavity, the muscles will act in drawing it into the joint, which may be assisted by the hand placed under the superior part of the arm, lifting it upwards and outwards.

In cases in which the fore-arm is bent, and cannot be extended without pain, the extending force must be applied to the arm; but when the fore-arm can be easily extended, by applying the extension at the wrist, the disadvantage of compressing the biceps will be avoided. From the relaxation afforded to this muscle, by the position of the arm at a right angle with the body, we shall more frequently have this in our power.

The strength of one person may be advantageously, and often successfully, employed in reducing this dislocation, by making the extension with the right hand, while the necessary motions are produced by the left, placed at the superior part of the arm; the body being retained by an assistant, or being fastened by a broad band passed round it to some immoveable object.

The disadvantages of girths placed under the axilla for counter-extension, from their impeding the elevation of the arm and the extension by their pressure on the adductor muscles, are very

apparent. They should, therefore, never be applied except when absolutely necessary.

2.—*Dislocation directly forwards.*

The head of the humerus, when dislocated, is often situated on the anterior part of the cervix of the scapula close to the root of the coracoid process. This is the most frequent position of artificial joint; and in producing dislocation on the dead body, the head of the humerus has been found by Bonn to occupy this situation.

This dislocation will be primarily produced by the elbow being thrown backwards, tearing up the capsule at the anterior part of the joint; or by any force applied so as to impel the head of the humerus against that part. The joint is supported at the anterior part by the tendon of the subscapularis, under which, if not torn, the head of the bone will insinuate itself. But this dislocation is in general secondary, succeeding to dislocation downwards and forwards; being produced gradually by the contraction of the muscles attached to the humerus, drawing it upwards between the subscapularis and surface of the scapula. The progress of the head of the humerus in this direction will be impeded by the coracoid process, at

the anterior part of the cervix of the scapula; by which circumstance the frequency of artificial joint in that situation may be accounted for.

The elbow, in dislocation forwards, is directed more backwards than in that downwards and forwards, from the head of the bone being placed on a part of the scapula, which is more convex anteriorly. In this dislocation, when the arm is directed downwards, it will maintain its natural length, as the centre of the head of the humerus is placed nearly opposite the middle of the glenoid cavity; and the tumor occasioned by the head of the humerus will be perceived on the fore part of the shoulder, at the superior and external part of the thorax, and will not be so well felt from the axilla. The shoulder will not be so much flattened, as in dislocation downwards and forwards, on account of the deltoid being less stretched, and of the support which the anterior part of that muscle will receive from the head of the bone placed under it. When the posterior part of the capsular ligament, and the infraspinatus and teres minor muscles, are not torn, they will be violently extended across the joint, and will retain the head of the humerus firmly under the edge of the glenoid cavity.

To reduce this dislocation, the arm should be elevated to a right angle with the body, and ex-

tension made in that direction, keeping the head of the humerus clear of the edge of the glenoid cavity, by the hand placed behind the arm pressing its upper part a little forwards. When by these means the articulating surface of the humerus is brought past the edge of the glenoid cavity, it will be drawn into that cavity by the action of the muscles, assisted by pressure on the anterior part of the arm in a direction towards the joint, the elbow being at the same time brought somewhat forwards. Bonn has proposed, that when this dislocation is secondary, the humerus should be brought to the passage into the inferior part of the joint by depression of the superior part of the arm.

3.—*Dislocation forwards and upwards.*

The head of the humerus sometimes gets beyond the coracoid process, and passes to the inner side of that process, lodging itself under the clavicle. This dislocation must always be secondary, and is in general produced by the continued action of the muscles arising from the scapula drawing the arm upwards; and by their efforts, gradually elongating the remainder of the capsular ligament, and muscles inserted into the head

of the humerus, round the coracoid process. When this dislocation is suddenly produced, these parts must be lacerated, to permit the passage of the head of the humerus so far from the glenoid cavity.

Petit and many other authors have described the situation of the head of the humerus in this dislocation to be between the great pectoral and serratus magnus muscle: but Bonn and Boyer have rightly contended, that the humerus lies under the subscapularis on the surface of the scapula.*

The symptoms of this dislocation are, a shortening of the arm, which is directed outwards and backwards. The existence of a tumor on the inside of the coracoid process, under the clavicle, and the motions of the arm being attended in every direction with great pain and difficulty, from the confined situation of the head of the bone, and deranged state of the soft parts.

The reduction of this dislocation is generally attended with great difficulty, from the adhesions formed by the head of the bone to the surrounding parts. Extension downwards and outwards

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* Bonn, de Humero Luxato.—Boyer, Maladies des Os, vol. ii. p. 95.

may be applied, so as to bring the head of the humerus to the anterior part of the joint. This may succeed in cases which are recent and have been suddenly produced, but when the dislocation has been of long duration, the force applied must be violent, and often is of no avail. Mr White of Manchester succeeded in the reduction of some cases of very long standing, by elevating the arm by means of pulleys fixed in the roof, till the body of the patient was suspended.* This method will act with great power in this dislocation, by turning down the head of the humerus and tearing its adhesions; neither does it appear to be attended with any material risk. It has been since followed by other surgeons with considerable success. In some instances, this method completes the reduction, while in others it merely removes the head of the humerus from its situation beneath the clavicle, nearer to the glenoid cavity. When the head of the humerus is brought to the cervix of the scapula by extension downwards, as by the method recommended by Mr White, its reduction is to be completed in the manner already described.

This dislocation has been denominated *disloca-*

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* Medical Observations and Enquiries, vol. ii. p. 373.

tion upwards by some,* while Petit and others apply to it the term, *forwards under the pectoral.*

4. *Dislocation to the Anterior Surface of the Subscapularis, or into the Axilla.*

The head of the humerus in the dislocations to the anterior surface of the scapula, which have already been described, is situated on the surface of the scapula, between it and the subscapularis muscle. But, in some cases, the head of the bone escapes from under the edge of the subscapularis, and assumes a position anterior to that muscle, in the space between it, the pectoralis and serratus magnus, which is denominated the axilla. The only dissection on record of a recent case of dislocation of the humerus, is of one of this kind. An accurate description of this case has been given by the late Mr Henry Thomson of London, the surgeon to whom it occurred. *

From examination of the anatomy of the joint, it appears, that before the head of the humerus can pass under the edge of the subscapularis, so as to

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* Desault. Ambrose Paree.

† Medical Observations and Enquiries, vol. ii. p. 340.

produce this dislocation, the whole of the capsule and tendons attached to the superior part of the tuberosity of the humerus, must be lacerated. On this account, the force required to produce this dislocation must be violent, and must be applied in such a manner, as to carry the head of the humerus to a distance from the glenoid cavity. In the case related by Mr Thomson, this laceration had taken place, and must have been the effect of great violence, as the tendons, in their separation, had torn off considerable pieces of the humerus to which they were attached; and Bonn, from experiment and observation, has concluded that it always takes place. " Neque minus," says that accurate author, " extra omne dubium posuisse et tam experimentis quam ratiocinio probavisse, mihi persuadeo, caput humeri ossis, non nisi laceratis musculorum scapulæ tendinibus humero insertis, hinc in rarissimo casu protractum et evulsum validissima vi ex suo articulo, revera in axillæ cavo, id est, inter musculum subscapularem et sérratum magnum, reperiri; frequentius autem, ne dicam alias semper, ubi lapsu egreditur, pone subscapularem, id est, inter illum et scapulæ superficiem hærere." *

* De Humero Luxato, p. 50.

This dislocation may be produced by the arm being suddenly thrown backwards, when the head of the humerus is passing out of the inferior part of the joint; or by any violent blow, impelling the head of the humerus downwards and forwards. The exact situation of the head of the humerus in the axilla will vary according to the degree of the injury;* and the appearances of the dislocated shoulder will be different according to the position of the dislocated bone. The appearances may resemble those which occur in any one of the dislocations to the anterior surface of the scapula, which have already been described, according as the head of the humerus may be placed in the axilla, opposite to the situation on the scapula, which it occupies in that dislocation. Neither is there any mark, by which it is possible to decide, whether the head of the humerus is in the axilla or under the subscapularis. Bonn has suggested the circumstances of the head of the bone being more moveable, and more distinctly felt in the former case, as marks which may assist us in forming a diagnosis;† but, though by these we may

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* Mr Hey of Leeds relates a case, in which the head of the humerus, torn from its attachments, protruded through the integuments of the axilla.—*Practical Observ. in Surgery*, p. 307.

† De Humero Luxato, p. 52.

be enabled to decide in a few remarkable cases, yet, in general, they will not be sufficient to afford any certain criterion.

The reduction of this dislocation will always be more difficult, than when the head of the humerus is situated between the subscapularis and scapula. The head of the humerus, having the subscapularis muscle between it and the glenoid cavity, will be prevented from entering the joint, unless it be again returned under the edge of that muscle into the aperture between it and the teres minor. To perform this, the arm should be elevated until the head of the humerus is depressed below the border of the subscapularis muscle. The head of the humerus should then be brought to a situation opposite to the aperture between the subscapularis and teres minor muscles, by moving the elbow a little forwards, or by pressing the superior part of the arm downwards and backwards; when attempts should be made to replace the humerus in its joint by moderate extension, while the upper part of the arm is lifted upwards.* The lacerated portion of capsule may be pushed in before the head of the bone, and may get between it and the surface of the glenoid ca-

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* See Thomson's case.—*Medical Observations and Enquiries.*

vity, which is to be remedied in this, as in every other case in which it occurs, by alternate gentle elevation, depression and rotation of the arm. *

May not the difficulty of reduction in some cases, which has been ascribed to the narrowness of the aperture in the capsular ligament, be explained by supposing them to have been dislocations into the axilla? The resistances to reduction which have been described as existing in those cases, are exactly similar to those which occur in dislocation into the axilla; and the symptom of the greater mobility of the head of the humerus, which is said to indicate the existence of such cases, is fully explained on this supposition. The case of Jean Seligné, given by Desault, as one of constricted aperture in the capsule, in which the head of the humerus could be pressed against the pectoralis, the latissimus dorsi, and integuments of the axilla, seems also to corroborate such an opinion. † The method of treatment which succeeded in those cases, would likewise produce similar effects in dislocation into the axilla, as by the extensive motions, the remainder of the tendon of the subscapularis might be torn off, and an opening thus

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* Kirkland's Observations, Append. p. 20.

† Journal de Chirurgie, vol. ii. p. 136.

formed into the joint, through which the head of the humerus might be directly returned. Such a laceration would also explain the tendency to re-dislocation which is particularly remarked in the case referred to, and in others of the same kind.

Mr Thomson, in describing his case, supposes the situation of the head of the humerus in it, to be the common one in dislocations of the shoulder. Bonn, who seems to be the first who has pointed out the true position of the head of the humerus in these dislocations, has refuted this opinion, and at the same time distinguishes dislocation into the axilla from the others which occur. By succeeding authors, it does not appear to have been noticed, or, if it has, it is included and confounded with the dislocations on the surface of the scapula, under the subscapularis muscle.

We have now described four varieties of dislocation to the anterior surface of the scapula. Of these the three first may be successively produced from the dislocation downwards, passing by insensible degrees into each other. There must, therefore, exist dislocations intermediate to those described, which do not correspond exactly with any of them, but an accurate conception of which may be easily deduced from the knowledge of those we have considered. Bonn was led, from the cir-

cumstances which these dislocations have in common, to consider them merely as varieties of the same kind of dislocation, and to denominate them accordingly *dislocationes versus interiora.* We also have adopted this classification of them, preferring, however, the denomination of *dislocations to the anterior surface of the scapula,* as more convenient and accurate.

DISLOCATION TO THE POSTERIOR SURFACE OF THE SCAPULA, OR BACKWARDS.

So rare is the occurrence of dislocation to the posterior surface of the scapula, that Desault, who perhaps enjoyed more favourable opportunities for observation than any other surgeon ever possessed, never witnessed an example of it; and Boyer, who has had extensive experience in this department of surgery, mentions in his work on the diseases of the bones, that he also had never met with an instance of it. These authors likewise agree in stating, that there is no authentic example of this dislocation on record, and Desault even appears to have doubted the possibility of its occurrence.* This dislocation is, however, men-

‡ Œuvres Chirurgicales, vol. i. p. 348.

tioned by almost every surgical author since the time of Hippocrates, as one of those to which the shoulder is liable; though it is in general difficult to ascertain, whether their remarks concerning it, be the result of actual observation, or merely copied from each other, or deduced from their knowledge of the natural state of the shoulder. Bonn, with whose work on dislocated shoulders the authors, who have stated that there is no well authenticated case of this dislocation on record, seem to have been unacquainted, has adduced three instances of its occurrence, which, though not so minutely described as might be desired, are sufficiently marked to prove that they were cases of this injury. Mr Astley Cooper of London, we have been informed, mentions in his lectures a case of this dislocation which had occurred in Guy's Hospital several years ago, under the care of Mr Forster, the only one which had happened in that, or Saint Thomas's Hospital, for more than twenty years. Since the publication of the works of Desault and Boyer, M. Fizeau of Paris has given an account of a case of this accident which occurred in a patient under his care in the hospital de La Charitè at Paris. This case was reduced by Boyer, who, we are also informed, had, in the dissection of a body, found an artificial joint

on the dorsum of the scapula; but the history of the case being unknown, it was uncertain, whether it had been the effect of a dislocation from external violence, or from disease of the joint. *

Of the three cases related by Bonn, two are quoted from the works of other authors. The first is from La Motte's "Traitè de Chirurgie," in which it is merely mentioned, that in a patient to whom he was called, " le bras gauche fut disloquè en dehors, de maniere qu'il formoit un angle en dedans;" to which is added, " je le fis plier en dedans, et lui rendis sa figure ordinaire." † The other is quoted from the work of Titsingh, a Dutch surgeon, in which the fact of the shoulder being dislocated outwards, by a fall from a height against an elevated obstacle, is stated without any more particular description. ‡

The third case occurred in the practice of Vander Duyn, a surgeon in Amsterdam, by whom it was communicated to Bonn. It is related as follows:—" Rhedarius, rhedam ducens, circa longè eminentem arboris ramum, sede suo ferè excussus,

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* Journal de Medicine, Thermidor, an. xiii.

† Bonn, de Humero Luxato, p. 22. La Motte, traitè de Chirurgie, tom. iv. p. 356. Obs. 397.

‡ Bonn, de Hum. Lux. p. 23.

constrictis habenis equorum, se sustinuit, unde humerum ramo impingens, luxatum habuit humeri caput retrorsum. Signa erant, fovea sub acromio, prominensque caput sub scapul æ spina, quod, rite administrata medela extensione brachii antrorsum, restitutum fuit." *

It is only from the case related by M. Fizeau that we are enabled to become at all accurately acquainted with the appearances of this dislocation as it occurs in the living body. In it they are described from nature minutely, and with a preciseness which could only be impaired by alteration ; there needs therefore no apology for transcribing the case. " Un homme d'environ 45 ans," says Fizeau, " d'une forte constitution, et sujet, depuis quelque temps, a des acces d'épilepsie, entra dans les salles de médicine de l'hôspital de la Charitè, au mois de brumaire, an 13, quelques jours après un de ces acces. Il se plaignait d'une grande douleur dans l'epaule gauche, avec impossibilitè d'executer aucun mouvement; on ne voyait, a l'exterieur, aucune marque de contusion, ni aucune difformité remarquable : seulement la tete ètait un peu inclinèe sur l'epaule malade, qui, par cette raison, paraissait un peu moins elevée que

* De Humero Luxato, p. 23.

celle de côtè opposé. Le bras etait appliquè contre le tronc, le coude un peu en devant, l'avant bras flêchi mediocrement. En promenant les doigts autour de l'articulation, ou ne trouvait ni depression au dessous de l'acromion, ni saillie au creux de l'aisselle, deux signes pathognomoniques de la luxation de l'humerus en bas ; mais, on sentait en pressant à la partie anterieure de l'articulation, un petit enfoncement, et en arriere une légère saillie qui lui correspondait, et sur laquelle on ne pouvait appuyer un peu fortement sans causer beaucoup de douleur. Les moindres tentatives qu'on faisait pour mouvoir le membre etaient extrèmement douloureuses, et le malade ne se prêtait qu'avec beacoup de peine : cependant je parvins a porter le bras avec assez de facilitè en haut et en bas, moins facilement en avant, et tres difficilement en arriere, où je ne l'etendais que tres peu a cause de souffrances que ce mouvement determinait, et de la resistance que j'eprouvais."

" Je ne pus tirer ni des assistans, ni du malade, aucun reseignement satisfaisant sur la maniere dont s'était operèe cette lesion : on me dit seulement que cet homme etait tombè par terre au moment de l'invasion de l'acces, qu'il avait eu comme a l'ordinaire, de violentes convulsions, a la

suite desquelles il etait restè dans l'etat où je le voyais."*

On lacerating the capsule in the dead body, and displacing the head of the humerus to the posterior part of the joint, it was found to occupy a situation close to the edge of the glenoid cavity, which corresponds with the symptoms of the case described. In this position the head of the bone was placed under the infraspinatus and teres minor muscles, which are covered by the portion of the deltoid arising from the acromion process and spine of the scapula. Bonn has supposed, that in this dislocation the head of the humerus is merely covered by the infraspinatus and teres minor muscles, and that if these were lacerated, it would become immediately subjacent to the skin.† But from the anatomy of the parts, it is evident that the head of the humerus, placed on the dorsum of the scapula in any position under the spine, must have the deltoid muscle intervening between it and the integuments. The flatness of the shoulder, which takes place in other dislocations, does not exist in this, as from the

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* Journal de Medicine, 1805, vol. x. p. 386.

† De Humero Luxato, p. 59.

natural position of the scapula the head of the humerus placed at the root of the acromion will still project, supporting the deltoid, so as to retain the fulness of the shoulder, though the greatest degree of protuberance must be situated more towards the posterior part than natural. By the root of the acromion process preventing the head of the bone from being placed farther upwards than when in the glenoid cavity, the arm, when by the side, will not be shortened; in any case it can vary but little from its natural length; in some cases it may be found to correspond exactly with the sound arm, while in others, in which the acromion projects more downwards, its length may be a little increased. In all cases, when the arm is placed at a right angle with the body, it must be more or less shortened, in proportion as the head of the humerus may be driven from the glenoid cavity under the spine of the scapula. Little change is produced in this dislocation, on the adductor and abductor muscles of the arm. The protuberance of the head of the humerus is merely removed from under one part of the deltoid to another, while the distance between the origin and insertion of that muscle is not increased. The supraspinatus is found in a relaxed state, on account of the short course, under the arch of

the acromion, by which it passes to its insertion into the humerus. These muscles will, therefore, not be injured in adduction. And, as the points of insertion of the pectoral, latissimus dorsi and teres major, are little, if at all, removed from their natural position, no impediment to abduction is caused by them. Hence the situation of the arm by the side, and the comparative facility of extending the arm in abduction, and of pressing the elbow to the side; or, as Fizeau expresses it, "le porter en haut et en bas." By the humerus being removed farther than natural from the coracoid process, the coraco-brachialis muscle is stretched: and the subscapularis is extended across the articulating surface of the scapula, as also the portion of the capsule which may remain untorn. From this disposition of parts, the difficulty of moving the arm backwards seems to arise, and in the dead body, that motion was most particularly resisted by the coraco-brachialis. Rotation outwards seemed to be also powerfully resisted by that muscle, as well as by the subscapularis. The head of the humerus being bound down by the muscles under which it is placed, will occasion a resistance to motion forwards, which however is not so difficult as backwards. The inclination of the head to the affected side, and apparent depression of the shoulder, are the natural conse-

quences of a desire to relieve the uneasiness about the shoulder, occasioned by the weight of the arm. The flexion of the fore-arm must be caused by the tendon ofthe biceps being carried away in its groove from its natural course, occasioning a tension of that muscle, although, in the dead body, this appeared to take place to a very small extent. The other symptoms are easily explained, by the laceration of the parts which had taken place, and the consequent inflammation.

Desault, in a description of this dislocation, of course supposititious, has asserted, that the elbow will be separated from the side;* but this does not agree with the case which has been described, nor is it necessary from the anatomy of the parts. Petit says, that, in dislocation backwards, the patient will suffer pain when the arm is removed from the breast, because in this motion the coraco-brachialis and pectoral muscles are stretched.† It is uncertain whether this author means by motion from the breast, motion backwards, or abduction. Although the contusion and laceration may cause considerable pain in attempts to produce abduction, yet by this mo-

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* Œuvres Chirurgicales, vol. i. p. 352.

† Traite de Maladies des Os. tom. i. p. 166.

tion the coraco-brachialis will rather be relieved from its tension, while the pectoral will not be more elongated than it is constantly in the natural motions of the arm.

When the subscapularis is not torn from its attachment, and any part of the capsular ligament remains entire, they will retain the head of the bone close to the edge of the glenoid cavity, under the root of the acromion process: and a protuberant angle, which is formed at the part where the spine of the scapula rises to form that process, will somewhat impede the progress of the head of the bone towards the posterior costa of the scapula. But by violent injuries these soft parts may be torn, and the head of the bone forced beyond the root of the acromion, lodging under the spine of the scapula, at a greater or less distance from the glenoid cavity. In such cases the symptoms will of course be somewhat varied, but the deformity of the shoulder will be greater, and the nature of the accident will be even more apparent.

The unfrequency of this accident is to be ascribed to the forces which can be applied to produce it being less numerous than those causing the other dislocations, and to the support which the joint receives at its posterior part from the deltoid. The arm cannot be employed as a lever in turning the head of the humerus out of the

posterior part of the joint. The projection of the thorax limits the natural motion forwards of the arm, and will therefore prevent such an injury.* It therefore requires the force to be applied directly to the humerus, impelling its head against the posterior part of the capsule, as by blows on the elbow when the arm is extended forwards, or on the superior part of the arm, when by the side or elevated; accidents which are, in general, more likely to produce fracture than dislocation. Fizeau seems to suppose, that violent action of the muscles of the shoulder alone may produce this dislocation;† but there appears great reason to doubt the possibility of such an occurrence, and in the case related by him it seems much more probable that the displacement arose from some blow received in the fall, or in the motions during the convulsive attack.

It is a controverted point, whether this dislocation can ever be secondary. Petit rather seems to have supposed that it is always so, and that it succeeds to dislocation downwards.‡ Boyer, Fizeau, and others, have asserted this to be impossible, from the intervention of the triceps between

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* Desault Journal de Chirurgie, 2d, 163.

† Journal de Medicine, 10, 392.

‡ Maladies des Os. i. p. 164.

the head of the humerus and dorsum of the scapula. * That this dislocation may be primary is proved by the cases which have been adduced; though the objections to the possibility of its occurrence as a secondary affection, have arisen from the authors of them having misconceived the nature of dislocation downwards, as described by Petit, and having confounded it with dislocation downwards and forwards. It is evident, that in dislocation downwards, as we have described it, the triceps does not intervene between the head of the humerus and dorsum of the scapula; and it can easily be conceived, that the arm may be moved in such a manner, as to throw the head of the humerus off the edge of the scapula to its posterior surface, though it is more likely to pass to the anterior surface, both from there being less resistance to its progress in that direction, and from the power which the adductor muscles will have in producing such an effect, a circumstance which has been accurately observed by Petit. †

In the reduction of this dislocation, the head of the humerus is to be brought outwards over the edge of the glenoid cavity, after which it must

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* Boyer, ii. p. 97. Journal de Medicine, vol. x. p. 391.

† Maladies des Os, 162.

move forwards into the joint. The obstacles to this will arise, from the action of the infra-spinatus and teres minor muscles retaining the head of the bone, and from the projecting edge of the glenoid cavity, impeding its progress in this direction. By raising the arm, and applying extension, and at the same time pressing the superior part of the humerus a little backwards, so as to bear it off the edge of the glenoid cavity, these may be overcome. The head of the humerus, may be pressed towards the joint, by the hand placed over it at the posterior part of the shoulder. When the articulating surface of the humerus is brought beyond the edge of the glenoid cavity, it will naturally slip into its place. This will be promoted by pressure on the superior part of the arm in a direction forwards, at the same time throwing the elbow a little back; the whole of the motions accompanying the extension being exactly the converse of those employed in dislocation directly forwards. When the dislocation is secondary, the raising of the arm will have somewhat the effect of depressing the head of the bone, to the entrance into the joint, and this may also be produced by the depression of the superior part of the arm, as recommended by Bonn. As it is impossible from examination to be certain that a dislocation is not secondary, in cases in which the reduction is not

easily accomplished, this manipulation should be tried, before proceeding to more violent means, as it can always be performed with safety, and may sometimes prove successful.

In some cases, this dislocation may probably be reduced by merely pressing the head of the humerus with the hand towards the joint; but, by raising the arm, any resistance which may arise from the Deltoid lying over the head of the humerus and surface of the glenoid cavity, will be avoided; while, by the extension, the reducing force may more easily and more advantageously be applied. In the case related by Fizeau, the reduction was performed by forcibly throwing back the elbow, by which motion the head of the bone was carried forwards into its cavity. During the subsequent night, the dislocation twice returned on motion of the arm, and was again readily reduced by the same means. In this method great resistance must arise from the coracobrachialis and subscapularis muscles, and there must exist great risk of their laceration. It is true, that it seems to have been rather accidentally adopted, after fruitless attempts to succeed by extension, and extensive motions of the arm in different directions. But the degree of extension might not have been sufficient, as it was produced by one hand only of the surgeon, and there is no reason

to doubt, that, had it been increased sufficiently in the direction we have recommended, it might proved as successful, and much less likely to be injurious than the method pursued.

In cases in which the head of the bone is carried to a great distance from the glenoid cavity, under the spine of the scapula, and in which, the tendons of ths subscapularis and anterior part of the capsular ligament have been torn off, there will be great reason to expect a re-dislocation, from the loss of the support to the joint, which these parts afford. In such cases, particular attention is required to retain the head of the humerus in its place, until the parts surrounding the joint reunite. In the case related by Fizeau, the tendency to redislocation existed in a great degree, though, from the account of the reduction, there seems room to suspect, that it may have depended as much on the injury inflicted on the parts by that operation as by the dislocation.

APPENDIX.

WHILE engaged in writing this Essay, I had an opportunity of seeing a case of the dislocation backwards, reduced at the Royal Infirmary by Mr Russel. I was also informed, that in his lectures on clinical surgery, that learned and experienced surgeon had mentioned, in commenting upon this case, that he had previously met with several examples of this rare accident. On applying to him for information concerning them, he readily communicated the subjoined letter, which, he has very obligingly permitted me to insert. I have also been favoured with a copy of sketches drawn from nature by Mr Russel, illustrating the appearance of the shoulder in two of these cases, from which the plate annexed to this Essay has been taken.

Edinburgh, 8th June, 1812.

SIR,

IN compliance with your request, I embrace the earliest opportunity to communicate the re-

sult of my experience on the subject of luxation of the humerus backwards.

I have met with three cases of the accident in the course of my own practice, and I have received accounts of two other cases from practitioners, on whose accuracy I can depend, my friend Mr George Bell, and Dr Wightman of Dunbar. Of these five cases, four were recent, the fifth did not present for examination till some weeks after the date of the injury.

In all the cases, the head of the humerus lay contiguous to the lower side of the spine of the scapula. The only difference with regard to the situation of the head of the humerus respected its distance from the edge of the glenoid cavity. When only a moderate force had been employed to dislocate the joint, the head of the humerus rested upon the posterior edge of the brim of the socket. In this case, there is no perceptible difference between the length of the two arms. I endeavoured to ascertain the circumstance more accurately, by taking measurements from different fixed points, one from the coracoid process to the internal condyle of the humerus, the other from the acromion to the head of the radius, and I compared them with corresponding measurements on the other arm, but I was not able to discover any assignable difference. The derange-

ment in the position of the head of the humerus occasioned some little difficulty, but not so much as to disturb the accuracy of the measurement essentially.

The thickness of the shoulder laterally was visibly increased, to a degree which made it appear rounder and more prominent than the shoulder of the other side.

On examining the parts immediately concerned in the dislocation, a hollowness was perceived in the region corresponding to the glenoid cavity, and the head of the humerus was felt distinctly lying on the dorsum of the scapula, and could be made to roll on rotating the arm.

The arm lay parallel to the side, without deviating perceptibly from its natural position. But it could not be made to separate from the side to any considerable distance, and was very much limited in all its motions.

The case, which had existed for several weeks before I saw the patient, was the consequence of very great violence, which produced some differences of circumstances, the head of the humerus being forced a great way farther backward upon the scapula. This removal of the head of the humerus to a greater distance from the edge of the socket, produced a corresponding approximation

of the internal condyle, and head of the radius to the coracoid process and acromion, and made the length of the arm considerably shorter. Its motions were at the same time very much restrained, partly from the derangement of the bones, and partly by the symptomatic swelling occasioned by the violence of the inflammation.

Luxations of the humerus backwards are not difficult to reduce in recent cases. All the four recent cases alluded to were easily reduced. A moderate distending force suffices to bring the head of the humerus over the edge of the socket, after which it slips into its place without any particular management.

In the fifth case, it was impossible to bring the head of the bone forward, on account of the strong adhesions which had taken place in consequence of the violent inflammation.

I am yours, &c.

JAMES RUSSEL.

M. Leveillé in a work published at Paris in 1812, entitled "Nouvelle Doctrine Chirurgicale," which I have had an opportunity of consulting since writing the above pages, refers to the late Mr Kirkland as a surgeon who had met with

cases of dislocation of the shoulder backwards. At p. 62 of Mr Kirkland's "Observations on Mr Pott's General Remarks on Fractures," &c. I find the following paragraph; "I have some few times," says that intelligent surgeon, "seen the head of the humerus under the pectoral muscle, but in making the extension, and moving the arm inwards, it slipped into the axilla, and was then reduced in the common manner. I have *oftener* seen the head of the bone dislocated *backwards towards the scapula.* I remember being called to a case of this kind in a hard working fellow, between twenty and thirty years ago. After discovering the nature of the accident, I placed the patient in a chair, and ordered the extension to be made with the arm in a horizontal posture, which I assisted, *by pushing with my own hand the head of the bone towards its place;* but though we brought it near to the glenoid cavity of the scapula, yet these steps alone could not replace it. I therefore *kept my hand fixed upon the head of the bone, that it should not recede,* in which I was assisted by a steady extension at the elbow, which I directed to be bent, and to be pulled backward at the same instant that the hand was turned a little upwards; upon which the bone was immediately reduced. *And I have since had the same success, under the same circumstances;* but I took the ma-

nagement of the fore-arm to myself, and got an assistant to push at the head of the bone;" and at p. 64, he mentions, that he failed in the reduction of an old dislocation, where the os humeri had slipped *backwards towards the scapula.*

Though Mr Kirkland has given no further description of these cases, and the term he applies to them is by no means expressive of their nature, yet it is evident, that the account he has given of their reduction, can apply to no other dislocation than that backwards. The fact, however, of his having seen more cases of this dislocation, than of that under the pectoral, whether this term be applied to dislocation directly forwards, or to that under the clavicle, is very remarkable, and is not conformable with the experience of any other surgeon.

THE END.

EDINBURGH:
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EXPLANATION OF THE PLATES.

PLATE I. Represents a front view of the appearances in dislocation backwards of the right shoulder, in the case of Alexander Storie, which was reduced in the Royal Infirmary.

PLATE II. Represents the appearances which presented themselves in the case which had existed for several weeks before it was examined by Mr Russel.

Fig. 1. A front view of the sound shoulder, which is reversed, that it may be more easily compared with the next figure.

Fig. 2. A front view of the dislocated shoulder.

Fig. 3. A lateral view of the dislocated shoulder.

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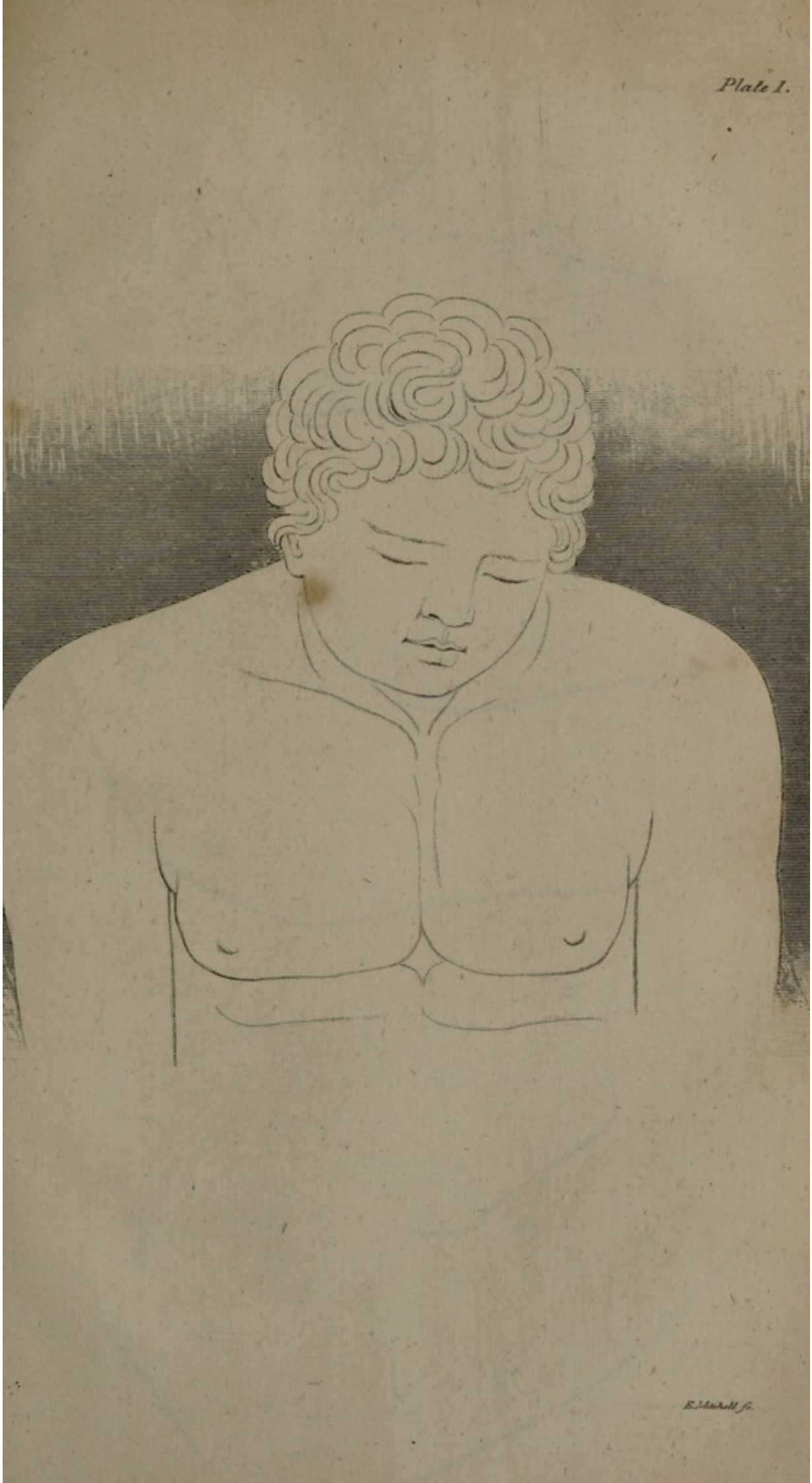
Plate I.



E. Mitchell fc.

Dislocated

Fig. 3.

Dislocated

Fig. 2.

Natural

Fig. 1.

Plate II.

Dislocation of the Shoulder Outwards or Backwards.

F. Middell, fc.

DISLOCATION