

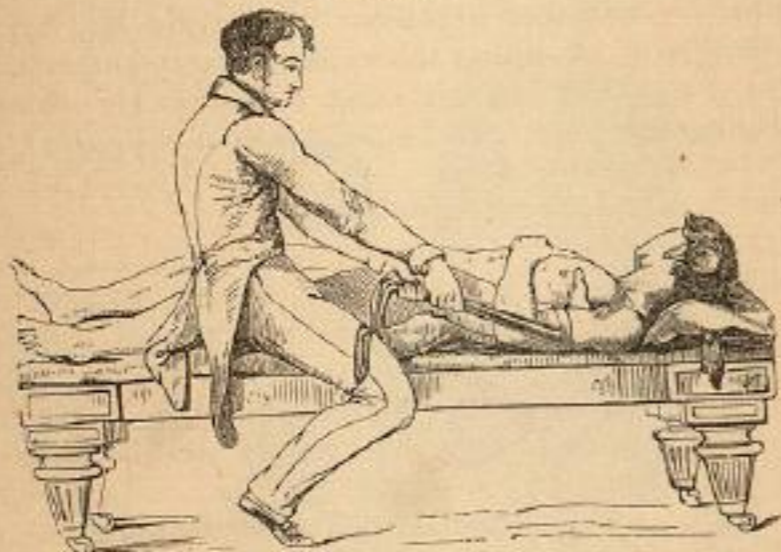
of pulleys in the ceiling, and placing a hand around the wrist of the dislocated arm, he drew the patient up until the whole body was suspended. No pressure, however, was made upon the scapula from above, which is no doubt the most essential part of the process.¹ By La Mothe's plan, Jobert succeeded after twenty-three days, when all the usual methods had failed.² Sometimes this procedure is modified by placing the hand of the operator against the top of the scapula, as is shown in the accompanying drawing (Fig. 277); and I have several times succeeded in this way after other measures have failed.

A gentle movement backwards or forwards, a slight rotation of the limb, or suddenly dropping the arm toward the body, diverting the attention of the patient, are little tricks of the operator, which now and then prove successful.

Sir Astley Cooper thus describes his method of applying the heel to the axilla (Fig. 278):

"The patient should be placed in the recumbent posture, upon a table or sofa, near to the edge of which he is to be brought; the surgeon then

FIG. 278.



Sir Astley Cooper's method of applying extension with the heel in the axilla.

binds a wetted roller around the arm immediately above the elbow, upon which he ties a handkerchief; then he separates the patient's elbow from his side, and, with one foot resting upon the floor, he places the heel of his other foot in the axilla, receiving the head of the os humeri upon it, while he is himself in the sitting posture by the patient's side. He then draws the arm by means of the handkerchief, steadily, for three or four minutes, when, under common circumstances, the head of the bone is easily replaced; but if more force be required, the handkerchief may be changed for a long towel, by which several persons may pull, the surgeon's heel still remaining in the axilla. I generally bend the forearm nearly at right angles with the os humeri, because it relaxes the biceps, and consequently diminishes its resistance."

¹ C. White, Amer. Journ. Med. Sci., Nov. 1836, from Med. Obs. and Inquiries, vol. ii. p. 273, London, 1764.

² Ibid., vol. xxiii. p. 237, Nov. 1838.

He was also accustomed in some cases to reduce the dislocation by substituting the knee for the heel. Placing the patient upon a low chair, the axilla is laid over the knee of the operator, and while one hand steadies the acromion process and scapula, the other presses downwards upon the lower end of the humerus (Fig. 279).

If some hours or days have elapsed since the occurrence of dislocation, it will be necessary to resort to chloroform or ether for the purpose of paralyzing the muscles, as well as with the view of preventing pain; and it may be necessary, in addition, to resort to pulleys, or to some similar permanent mode of extension. The same measures also sometimes become necessary in very recent cases, especially in muscular subjects.

In employing the pulleys we generally operate, not exactly in a line with the axis of the body, nor at more than a right angle, but between an angle of 45° and a right angle.

Mr. Skey has suggested a plan by which we may combine the principle of the heel in the axilla with the pulleys, but which plan would, in my judgment,

be very much improved by a counter-extending force applied to the acromion process. I ought to say, however, that Mr. Skey prefers that the scapula should not be fixed, believing that the reduction is much more easily effected when the glenoid cavity is drawn downwards in the act of making the extension.

With all respect for the opinion of this distinguished surgeon, I cannot precisely agree with him; and while I would be disposed to recommend in some cases a trial of his method of applying the pulleys, I would, at the same time, or certainly in the event of its failure, add

FIG. 279.



Sir Astley Cooper's mode of operating with the knee in the axilla.

FIG. 280.



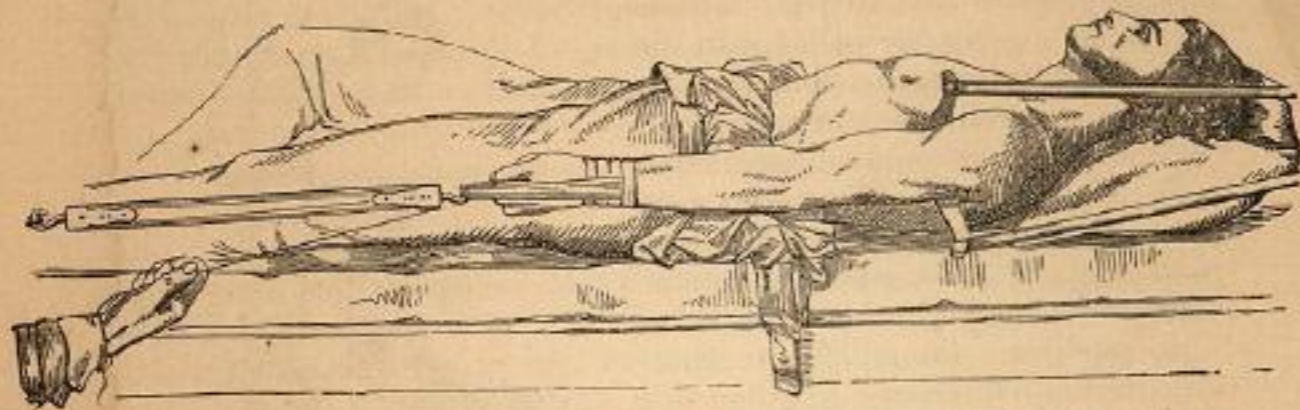
Iron knob employed by Skey, instead of the heel.

the acromial support, and especially would I advise that the arm should be more abducted. The following is Mr. Skey's method, as described by himself:

"There is no reason why, in very muscular subjects, or in old dislocations, the same principle may not be applied conjointly with the use

of pulleys. For the purpose of retaining this admirable because most efficient principle, I employ a well-padded iron knob, which may represent the heel, from which there extend laterally two strong straight branches of the same metal, each ending in a bulb or ring of about four inches in length, the office of which is designed to keep the margins of the axilla as free from pressure as possible." The iron knob is to be pressed well up into the axilla and attached to cords fastened to a staple;

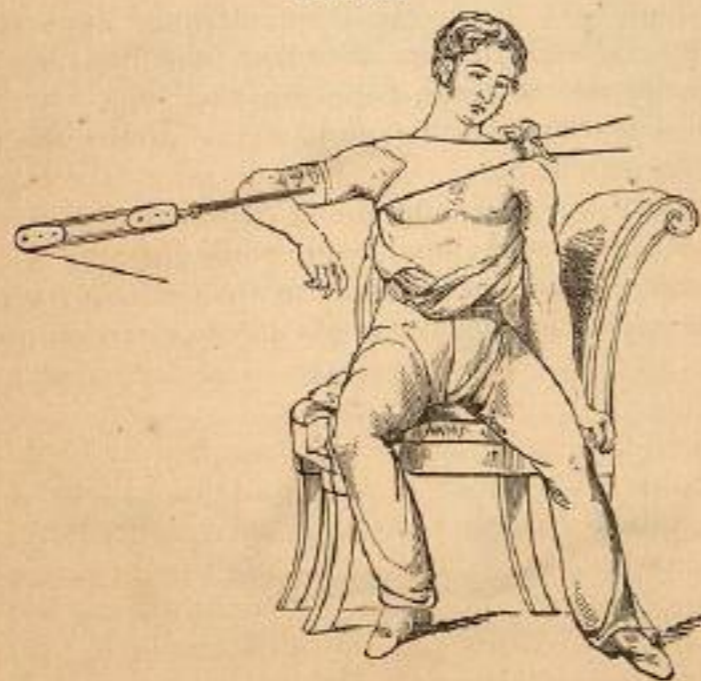
FIG. 281.



Skey's method of making extension and counter-extension with pulleys.

the patient lying upon his back or inclined a little to the opposite side. The arm is then to be drawn downwards by the pulleys, "as nearly as possible parallel to, and in contact with, the body."¹

FIG. 282



Sir Astley Cooper's mode of making extension with pulleys.

In this way Mr. Skey says that he has succeeded in reducing a great many dislocations, even when occurring in very muscular men, and after

¹ Skey, Operative Surgery, Amer. ed., p. 93.

some days', weeks', or even months' duration; and he thinks the plan especially applicable to cases which require long and persistent extension.

Mr. Skey and many other surgeons prefer to make the extension from the hand. I have succeeded as well, and it seemed to be less painful to my patients, when I have followed the practice of Sir Astley, and made the extension from the arm. Sir Astley always made the extension more or less out from the line of the body, and generally almost at a right angle when using the pulleys; the scapula being made fast by "a girt buckled on the top of the acromion," or by a split cloth (Fig. 282).

The instrument invented by Dr. Jarvis, of Portland, Conn., called the adjuster, useless and even mischievous as I have found it in its application to the treatment of fractures, possesses considerable merit, as an apparatus for reducing old dislocations, especially of the shoulder. The principal advantage which may be claimed for it is, that while the forces are being applied the limb may be moved pretty freely in all directions; thus enabling us to employ rotation at the same time that extension is made. We may also lift or depress, adduct or abduct the limb without relaxing the extension. In the hands of American surgeons it has occasionally been successful when other means have failed. Dr. Jarvis has related a case presented at the Marine Hospital, at Mobile, Alabama, of forty-two days' standing, which he reduced on the second attempt, after other means had failed;¹ and Dr. May, of Washington, reduced a similar dislocation at the end of six weeks, by the same apparatus, without, however, having previously resorted to any other means.²

I have myself used the apparatus occasionally, both in my hospital and private practice, and can speak favorably of its operation.

Mathieu, Robert, and Collin have modified the apparatus in several particulars; illustrations of both of which modifications Poinsoy has furnished in the French edition of this treatise.³

Kocher⁴ flexes the forearm upon the arm; carries the elbow against the side of the body; abducts the hand, in order to rotate the head of the humerus outwards, until resistance is experienced; carries the elbow forwards, upwards, and slightly inwards, while the arm is still flexed at a right angle, and the hand maintained in a position of forced abduction; then the arm is rotated inwards, and the hand is carried upon the sound shoulder. All of these manoeuvres are to be executed as slowly and gently as possible.

I must not omit to mention the practice adopted by Prof. H. H. Smith, of Philadelphia, according to whom nearly all dislocations of the shoulder, of a recent date, may be promptly and easily reduced by manipulation alone. His method consists, first, in flexing the forearm upon the arm, while, at the same moment, the elbow is lifted from the body; second, in rotating the humerus upwards and outwards, employing the forearm as a lever; and third, in reversing this last movement, that is, rotating the

¹ Jarvis, Boston Med. and Surg. Journ., vol. xxxix, p. 215.

² May, *Ibid*, vol. xxxv, p. 454.

³ Poinsoy, *op. cit.*, p. 825, etc.

⁴ Kocher, Rev. Men. de Chir., 1882, t. 2, p. 834.

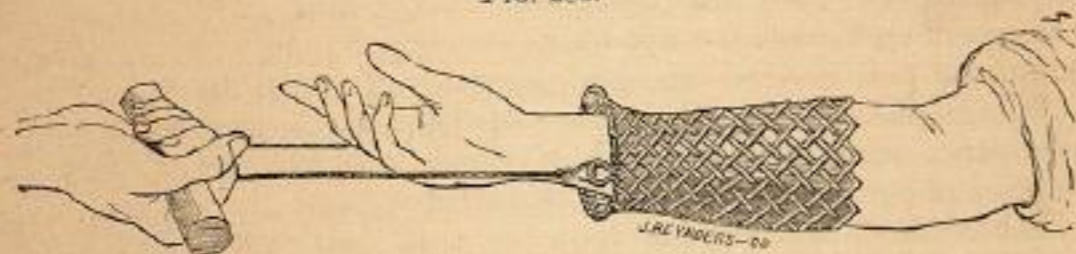
humerus downwards and inwards, while at the same moment the elbow is carried again to the side.¹

When the dislocation is into the axilla, this latter manœuvre will generally succeed; but if the head of the humerus has slipped forwards, even only sufficient to engage itself slightly under the tendons of the coracobrachialis and biceps (approaching to, or actually in the condition of a subcoracoid dislocation), the outward rotation of the humerus will inevitably thrust the head further forwards, and fasten it more certainly underneath these tendons; while the rotation of the humerus in the opposite direction will alone often be sufficient to carry the head directly into the socket.

Mr. John Reynders, instrument-maker of this city, has recently shown me a cone made of ash-splittings, braided, and which is large enough to embrace and fasten itself to the forearm, for the purpose of extension (Fig. 283). He informs me that the apparatus was imported from Germany. It is the same as that described by me many years since as the "Indian puzzle," and which will be seen represented in the chapter on "Dislocations of the Fingers."

Ancient Dislocations of the Shoulder.—Finally, I ought to speak somewhat more in detail of the manner of procedure and of the principles involved in the reduction of old dislocations, or of dislocations requiring the interposition of mechanical appliances; especially with a view to the more complete exposition of my own practice in these cases.

FIG. 283.



Indian puzzle, employed to make extension in dislocations of the shoulder.

If the dislocation is recent, and reduction is found impossible without the aid of mechanical apparatus, the difficulty will be understood to consist mainly, if not altogether, in the resistance offered by the muscles. If, in a few exceptional cases, a "button-holing" of the head and neck by the capsule, or the margin of the glenoid fossa, present themselves as obstacles, they must be considered as unusual and extraordinary impediments, the existence of which may be regarded rather as possible than probable.

Almost our sole purpose, then, it will be understood, in all recent cases requiring mechanical appliances, and in some ancient cases, is to overcome the contraction of the muscles.

I prefer always to place the patient upon a mattress laid upon the floor; two silk handkerchiefs, or two pieces of a cotton roller, are then laid along the radial and ulnar sides of the humerus, and over the middle of these, immediately above the condyles, a wetted roller is applied, its

¹ H. H. Smith, *Gross's Surg.*, ed. of 1863, p. 152.

end being made fast with a needle and thread rather than with a pin. The upper ends of the longitudinal strips, or of the handkerchiefs, are now turned down and tied to the opposite ends, thus converting them both into lateral loops. For the purpose of making counter-extension, a sheet is passed around the body under the axilla, and made fast to a staple; while an intelligent assistant is to manage the scapula with his naked hands, either by pulling with his fingers placed under the process, or by pushing with the palm of his hand and ball of his thumb. The pulleys, secured to a staple exactly opposite to that which holds the counter-extending band, are made ready, but not for the present attached to the arm.

As soon as the patient is placed completely under the influence of an anæsthetic, the operator is ready to proceed with the reduction. It is my maxim never to attempt to accomplish by complicated and violent measures what may be done as well by more simple and gentle means. I think it proper, therefore, to make several attempts at reduction by manipulation alone, aided now by the anæsthetic, the extending and counter-extending bands, etc., before resorting to the pulleys. Seating himself upon the mattress, his boots being removed, the surgeon should bend the forearm to a right angle with the arm, and planting one heel in the axilla, with one hand he should seize upon the loops at the elbow, and with the other steady the hand and forearm of the patient, while he proceeds to make firm traction for a few seconds in the line of the body, or only a little out from this line. Failing in this, he may direct the assistant to seize upon the scapula, and make counter-extension; still not succeeding, he may change his foot from the axilla to the acromion process, and pull directly outwards at a right angle with the body, or he may swing himself gradually around until he comes to be above the head of the patient, and the foot presses firmly upon the top of the scapula; now descending again in the same direction, he will very probably find the limb reduced, or capable of being reduced easily, by operating upon it as a lever by laying it across the body while at the same moment it is rotated slightly inwards.

If still the reduction is not accomplished, the pulleys must at once be put in requisition. The sheet, passed around the chest and fastened to a staple, is only a means of supporting the body and rendering it more steady; as a means of counter-extension its value is inconsiderable. To make fast the scapula, we must still rely mainly upon the naked hands of strong men, or upon a strap drawn firmly across the process and held in place by an assistant.

Whenever we employ extension without the aid of anæsthetics, as sometimes we are compelled to do, it must be constantly borne in mind that it is proposed to conquer the muscles by fatiguing them, and that this cannot be done by a force suddenly applied, however great it may be, but only by gentle, steady, and long-continued extension. The muscles, when attacked openly and vigorously, resist, and will suffer laceration rather than yield, while, on the other hand, an insidious but persevering approach seldom fails to end in their defeat. The same is true, but in a much less degree, when the patient is insensible from anæsthesia.

The forearm is again flexed, and the arm carried out to a right angle with the body, the pulleys secured to the loops, and the assistant takes hold upon the process, while the surgeon draws gently upon the rope attached to the pulleys; as soon as everything is moderately tense, he is to desist for a few moments. Again the rope is drawn upon gently, and again the progress of the extension is suspended. In this way the operator is to proceed during half an hour, or two hours, as the nature of the case may demand; occasionally rotating the humerus, and occasionally lifting its head toward the socket. Meanwhile, it is understood that the principal counter-extension is made by the assistants, who must relieve each other, at the acromion process. The sheet in the axilla, or rather against the side of the chest, has some value in this respect when the arm is at a right angle with the body, but in itself it cannot control the scapula, only as it holds the body to which the scapula is attached. Much, therefore, as we may regret the inconvenience of making counter-extension by hands alone, experience and anatomy alike must teach that here it is the only mode. If these dislocations are reduced often by other methods, as no doubt they are, then it is only an evidence that in these examples little or no counter-extension was necessary.

Sometimes the dislocation is not reduced when the extension is given up, but if then a resort is promptly made to some one of the simple methods already described, while the muscles are still exhausted, it very often happens that the reduction is easily accomplished.

It will be prudent in all cases, in order to prevent a redislocation, whether the dislocation is recent or ancient, as soon as its reduction is effected, to place the arm in a sling and secure the elbow to the side by a few turns of a roller. I do not think the axillary pad necessary, and I am afraid it has sometimes done as much mischief as the dislocation itself.

The following example will illustrate the variety of expedients to which we are obliged sometimes to resort before our efforts prove successful:

Thomas Leeding, of Niagara Co., N. Y., æt. 52, a laborer, and a muscular man, dislocated his right arm into the axilla, by jumping from the cars when they were in full motion. The blow was received upon the shoulder. An intelligent country surgeon, assisted by several other persons, attempted reduction within an hour after the accident, but failed, and as the patient had some distance to travel, he was not brought under my notice until eighteen hours had elapsed. We first administered chloroform, and then, while an assistant held firmly upon the acromion process, I pulled in the line of the body, then outwards, and finally upwards, but to no purpose. Having then applied Jarvis's "adjuster," and after the arm had been kept extended at a right angle with the body fifteen minutes, we removed the apparatus, and found the bone in its place.

John Harrington, æt. 50, a very large and powerful man, fell while intoxicated, and dislocated his left humerus into the axilla. No surgeon was called until the tenth day, when he first consulted Dr. Dudley, who at once brought him to me. Without delay we applied the pulleys, and placing the arm at a right angle with the body, we made extension fifteen minutes; occasionally also rotating the arm. We then removed the pulleys, and while an assistant held upon the acromion process, with my

heel in the axilla, I made extension in the line of the axis of the body, then outwards, and finally upwards with my foot upon the top of the scapula. I next seated my patient in a chair, and drew his arm and axilla forcibly over my knee. The bone was not yet reduced; I therefore bled him twenty-four ounces, or until partial syncope was induced, and proceeded to repeat most of these processes, but with no better result. At this moment I determined to use sulphuric ether, which had just been introduced as an anæsthetic, and while he was completely under its influence the pulleys were again applied, and the extension continued for some time, and until the rope broke. He was then again placed in a chair, and the axilla brought over my knee, when in a moment the reduction was accomplished.

Julia McKnight, æt. 39, was admitted to ward 28, Bellevue, in Nov. 1866, with a dislocation of the humerus into the axilla, which had existed seven weeks and one day. The deltoid was much wasted and the hand somewhat numb. Before the class of medical students, the patient being under the influence of ether, the reduction was effected; but not until various methods of manipulation and extension had been tried and had failed. Having finally carried the arm directly upwards—La Mothe's method—and in this position employed extension, the arm was again brought down, and with moderate manipulation the reduction was effected. The return of the bone was sudden, and was accompanied with a slight grating sensation; it was observed also, that a hard bony projection was left in the axilla, which was no doubt the margin of a new socket. The head of the humerus could be plainly seen and felt in its socket, rendering it certain that I had not broken the surgical neck of the humerus.

John Bowles, of Buffalo, aged 45 years, an Irish laborer, tolerably muscular, but spare, fell down a flight of stairs, and dislocated his left humerus into the axilla. The shoulder became much swollen, and was very painful, but he did not suspect a dislocation and did not consult a surgeon. Eight weeks after the accident he applied to me. There were present the usual signs of this dislocation, but the arm was by careful measurement one inch and a half longer than the other.

The reduction was accomplished on the same day, in the presence of Drs. Lee, Webster, Coventry, Ford, and Jewett. The time occupied in the reduction was about two hours. An attempt was first made with the heel in the axilla and with violent rotation and extension. The same plan was repeated with the aid of ether, which was administered freely. Jarvis's adjuster was now applied, with no result, except that, either in consequence of the force employed by the adjuster, or in consequence of the free use of ether, or of both, he became convulsed violently, which was accompanied by frothing at the mouth and other grave symptoms. The adjuster was removed, and the exhibition of ether discontinued. As soon as the convulsions ceased, and before consciousness had returned, extension, rotation, etc., were again made by hands. Finally, after all extension was relinquished, placing my knee in the axilla, I reduced the bone by a very slight rotary action upon the arm; the bone was at once plainly in its socket, but the unusual length of the limb continued, being one inch and a half longer, though it could be shortened to the same length as the other by lifting the elbow. A pad was placed in the axilla,

and the arm secured with a sling and roller. The next day the arm remained in place, but it was now only one inch longer than the other. At the end of a fortnight it was only three-quarters of an inch longer, and could be reduced to the same length by lifting; the pain and swelling about the shoulder, which never were great, were subsiding, and the patient was dismissed.

However skilfully our efforts may be directed, they will be found occasionally to fail; either owing to adhesions which have taken place between the head of the bone, or rather its capsule, and the adjacent tendons, muscles, etc., to some extraordinary position of the head and neck of the bone in its relation to ligamentous or tendinous structures, to a filling up of the glenoid fossa, or to some other cause not fully explained. Such failures have happened not only in the hands of ignorant and unskilful surgeons, destitute of appliances, but also in the hands of those who are the most expert, and who are the most completely provided with all the necessary apparatus. Indeed, if the truth were known, it would probably be found that the number of failures after the sixth or eighth week has been greater than the successes. The records of surgery, however, furnish a great many examples of ancient dislocations of the humerus reduced after periods ranging from one month to six, or even longer. Sédillot¹ claims to have succeeded after one year and fifteen days, and Koenig² after eight years.

In 1819, Weinhold, for the purpose of reducing an ancient dislocation of the humerus, cut the pectoralis major three fingers' breadth from its insertion, and obtained an easy reduction.

Wutzer,³ in two cases, cut the coraco-brachialis. Poinso, to whom I am indebted for this statement, adds that the result is not known to him.

Dieffenbach was able to accomplish the reduction of a forward dislocation after two years, but not until he had cut the tendons of the pectoralis major, latissimus dorsi, teres major, and teres minor, and had divided the ligaments surrounding the new joint.⁴

Simon,⁵ in 1852, and Polaillon,⁶ in 1881, combined subcutaneous incisions of the fibrous tissues surrounding the joint, with prolonged extension, and were thus enabled to reduce this dislocation. Poinso, however, does not think these incisions were of any particular value.

In a woman, æt. 48, who had a forward and downward dislocation of seven months' standing, accompanied with great pain and inability to use the limb, H. Burekhardt⁷ through an open incision divided the adhesions, and during the efforts at reduction the great tuberosity was partially torn off. The result was a very sensible improvement in the condition of the arm.

Mears,⁸ of Philadelphia, has twice practised subcutaneous osteotomy, in order to establish a false joint, and with results satisfactory to himself.

¹ Sédillot, Art. Lux., Dic. Encyc. des Sci. Méd., 2d ser. t. 3, p. 281.

² Koenig, by Ceppi, Rev. Men. de Chir., 1882, t. 2, p. 828.

³ Wutzer, Kronlein, die Lehre von Lux. in Deuts. Chir. von Billroth u. Lueke, Lieferung, 26, p. 71.

⁴ Dieffenbach, Boston Med. and Surg. Journ., vol. xxii. p. 382, from Medicin. Zeitung.

⁵ Simon, from Kronlein, loc. cit. ⁶ Polaillon, Poinso, op. cit., p. 834.

⁷ Burekhardt, Württemberg. Med. Correspond., 1878, No. 4, p. 35.

⁸ Mears, Phila. Med. and Surg. Reporter, Oct. 1877.

Desprès¹ has had recourse, in two cases, to fracture of the neck of the humerus, without intending to establish a pseudo-arthritis. Poinso, in commenting upon these cases, says that the results of the two cases, as reported, are not likely to impress the reader favorably.

In a case in which the head of the humerus, long dislocated, pressed upon the brachial plexus, causing great suffering, Dr. Edward Warren, of Baltimore, practised resection, in 1869, giving immediate and permanent relief.²

Dr. Thomas Annandale, Surgeon to the Edinburgh Infirmary, in the case of a woman 62 years old, with a subclavicular dislocation of six weeks' standing, having failed to reduce the bone, and the patient suffering great pain on account of the pressure upon the axillary nerves, cut down upon the head of the humerus, along the inner border of the deltoid, and after separating the axillary artery, which was adherent to the bone, and having sawn through the surgical neck of the humerus, he removed the head in fragments and with great difficulty, inasmuch as it was firmly bound to the ribs by fibrous and bony tissues. In the course of this procedure he wounded the circumflex artery so near to its origin, that he was obliged to tie the subclavian above and below the origin of the circumflex. The operation was performed February 16, 1875. On the 18th the hand and forearm became gangrenous, and on the 19th she died.³

Volkman⁴ practised resection in a man, æt. 53, who had a subcoracoid dislocation of five weeks' standing, and which it was found impossible to reduce. The incisions were made through the axillary space, and at once opened into a cavity of the size of the fist, inclosing the head of the bone, and containing blood and serum. It was ascertained now that the blood, which still continued to flow, came from the axillary vein, which had been wounded by a sharp fragment of bone, separated from the lesser tuberosity. The vein was ligated, and the resection made, but notwithstanding the resection the head of the humerus could be only partially replaced. At the end of three weeks this patient left the hospital, with some improvement in the position and motion of the arm.

In the case of a man, æt. 30, with a dislocation of seven or eight months' standing, and in which redislocation was constantly occurring, Cramer⁵ practised resection with most satisfactory results.

In a case of repeated redislocations of the humerus Kuster⁶ also practised resection, and obtained at the end of seven weeks "very satisfactory results."

Volkman⁷ has also practised resection in the case of a man, æt. 30, who had repeated, spontaneous redislocations. The incisions were made from the anterior surface of the arm. Subsequently the patient informed

¹ Desprès, Bull. Soc. de Chir. de Paris, 1879, pp. 24 et 742.

² Warren, Gross's Lecture, Amer. Journ. Med. Sci., April, 1876, p. 452; also, Baltimore Med. Journ., Sept. 1871, p. 532.

³ Annandale, Med. Times and Gaz., May 29, 1875, p. 576.

⁴ Volkman, Popke, Inaug. diss. Halle, 1882; Anal. in Centralblatt für Chir., 1883, p. 28.

⁵ Cramer, Berliner Klin. Wochenschrift, 1882, No. 2.

⁶ Kuster, Rev. Mens. Chir., 1882, p. 867.

⁷ Volkman, Popke, loc. cit.

Volkman, by letter, that he could use his arm a great deal better than before the operation.

It would be unjust to the young surgeon not to call especial attention to the numerous examples of serious and even fatal accidents which have followed upon the attempts to reduce ancient dislocations at this joint.

Rupture of the Axillary and other Arteries.—The late George C. Blackman, of Cincinnati, a distinguished surgeon, having met with one of these unfortunate accidents in his own practice, had the candor to make a public statement of the case and of the circumstances which attended it. In a letter to the editor of the *Western Lancet*, published in the November number for 1856, he wrote as follows:

"About the 10th ult., aided by yourself, I succeeded in reducing by manipulation, without the pulleys, a dislocation into the axilla, of eighty days' standing. The reduction was accomplished in a very few minutes, under the influence of chloroform and ether, and the next morning the patient left for the country, in a comfortable condition. Since that I have received no tidings from him. Encouraged by the result in this case, another patient, himself a physician, a tall, athletic man, and about fifty years of age, decided to submit to the same manipulation, although his arm had been dislocated for about sixteen weeks. The dislocation was downwards and inwards, and about the tenth week an unsuccessful attempt, by another surgeon, had been made with the pulleys, to which the force of six men was applied for two and a half hours. The patient being under the influence of chloroform and ether, aided by yourself, Drs. Fries, Cary, Graham, and Kauffman, I commenced by manipulations, adducting, rotating, abducting, and elevating the arm. These efforts had been made for about ten minutes, and the least possible violence employed, when a tumefaction appeared in the pectoral region, which, in a few minutes, attained a considerable size. Supposing that the axillary artery was ruptured, as no pulse could be felt at the wrist, a ligature was immediately applied to the vessel at the upper part of its course. The operation was performed about 10 o'clock A. M., and compression of the pectoral region made by means of a sponge and broad roller. On removing this the next morning, the tumefaction had nearly disappeared. The patient continued comfortable, and about nine days after the application of the ligature I was compelled to leave the city on a professional visit to Indiana. I left on Friday afternoon and returned on Monday morning, at which time I learned that my patient had died on Sunday morning, from hæmorrhage at the seat of ligature."

M. Panas¹ saw at the Hospital St. Louis, a diffuse aneurism in the armpit supervening fifteen days after a reduction of a dislocation (intra-coracoidean) which was of forty-eight hours' standing. The reduction had been by ordinary manual extension, while the head was pressed forcibly outwards by the thumbs sunk deeply into the axilla. M. Panas tied the subclavian artery in the neck, outside of the scapular muscles. The patient succumbed three months later from articular suppuration.

Gunther² reduced a recent dislocation under anæsthetics, by elevation

¹ Panas, *Art. Épaule*, *Nouv. Dic. Méd. et Chir. Prat.*, t. 13, p. 441.

² Gunther, quoted by Marchand, *Thèse d'Agrég.*, Paris, 1875, p. 40.

and direct pressure upon the head of the humerus, in a man 20 years of age, who had before dislocated the same arm. At the end of three weeks an aneurism was discovered in the axilla. The subclavian was tied, suppuration ensued, the abscess opened, and death resulted from hæmorrhage.

W. Korte¹ reports a case in which a recent dislocation forwards and inwards was reduced by a bone-setter, an axillary tumor formed, which was punctured several times, and the patient died five weeks after the accident of septicæmia. He reports also another case of a similar but ancient dislocation, in which several attempts were made at reduction, during one of which the axillary artery was ruptured. The aneurism soon opened spontaneously, and the patient died of hæmorrhage.

In the case of a man, æt. 62, admitted to the General Infirmary of Sheffield, England, with a dislocation of eight weeks' standing, slight attempts at reduction, with the heel in the axilla, resulted in the formation of an axillary tumor. The next day the axillary artery was tied, and new attempts at reduction were made. The patient died at the end of twenty-four hours.²

M. Letiévant,³ of Lyons, found in his wards a patient with a dislocation of twenty days' standing. The reduction was effected under chloroform, but not until violent tractions had been made. It was followed immediately by an axillary aneurism and paralysis of the radial nerve. M. Letiévant, after having tried successively digital and elastic compression, resorted to ligature of the axillary artery, outside of the scapular muscles. The aneurism got well, and the paralysis eventually disappeared.

In Carruther's⁴ patient, a dislocation having been promptly reduced, was soon reproduced. The second reduction was again easily effected, but on the following day there existed tumefaction and signs of incipient gangrene. Carruther amputated the arm and the patient died the next morning. The autopsy revealed a laceration of the axillary artery below the origin of the subscapular.

A man 55 years of age, and having a dislocation of forty-eight days' standing, was subjected to repeated attempts at reduction, which resulted in a diffuse aneurism. Four months later he was admitted to Charing-Cross Hospital. Dr. Bellamy amputated the arm at the shoulder-joint, and the patient died during the operation.⁵

Desault twice observed, after attempts to reduce old dislocations of the shoulder, "*tumeurs aériennes*." It is quite probable, however, that in each case the tumor was caused by the rupture of a bloodvessel, and probably an artery.⁶

Pelletan, also, attempting to reduce a dislocation of four months' standing, thought he produced a *tumeur aérienne*, but it being opened the patient bled to death.⁷ Probably the axillary artery was torn.

Malgaigne, attempting to reduce a dislocation of sixty-eight days'

¹ Korte, *Arch. für Klin. Chir.*, Bd. 27, Hft. 3, p. 631.

² *British Med. Journ.*, Feb. 2, 1883.

³ Letiévant, *Lyon Méd.*, 14 Juil. 1878, p. 383.

⁴ Carruther, *Brit. Med. Journ.*, May 18, 1872.

⁵ Bellamy, *The Lancet*, 1880, vol. 2, p. 260. (Poinsot, *op. cit.*, pp. 838, 839.)

⁶ Desault, *Journ. de Chir.*, t. iv. p. 301.

⁷ Pelletan, *Chir. Clin.*, t. ii. p. 951.

standing, was surprised by a sudden tumefaction in the axilla, and on the shoulder, which caused so much alarm as to induce him to discontinue his efforts. Ice was applied, and the hæmorrhage, which he thought came from muscular branches, was arrested.¹ Verduc saw the axillary artery ruptured in the same manner, in consequence of which the patient died.² J. L. Petit, Dupuytren, and Nélaton met with similar cases. C. Bell reports an example of rupture of the artery with extensive laceration of the muscles, and which demanded immediate amputation. Delpech ruptured the artery, and his patient died immediately.³ Flaubert was more fortunate, the effused blood being absorbed after a few days.⁴ John C. Warren, of Boston, tied the subclavian artery to arrest the progress of an enormous aneurismal tumor in the axilla, caused by the reduction of a recent dislocation.⁵ Gibson, of Philadelphia, lost two patients from rupture of the artery in attempting to reduce old dislocations of the humerus,⁶ and he relates another fatal case occurring in the practice of David, of Rouen. Leudet, of Rouen, lost a patient in this way in 1825. In this latter case, and in both the cases occurring in the practice of Gibson, there was a fracture, also, of the lower margin of the glenoid cavity. Callender ruptured the artery in an attempt to reduce a dislocation at six weeks.⁷ Mr. Lister met with the same accident.⁸

Poinsot suggests that in some of these accidents the dislocation itself, rather than the attempts at reduction, might have been responsible for the rupture of the axillary artery; and in support of this suggestion he cites the observation of M. Panas,⁹ that the rupture always takes place on the level of the subscapularis. He refers also to examples furnished by Berard,¹⁰ Le Dentu,¹¹ Adams,¹² and Korte,¹³ in which the existence of the aneurism seemed to precede the attempt at reduction.

Berard's patient succumbed speedily. Le Dentu's patient, in whom scapulo-humeral disarticulation was practised, died also. Adams reduced the dislocation, then tied the subclavian, and the patient recovered. In Korte's case the dislocation, caused by a direct blow, was reduced spontaneously. An aneurism ensued and the subclavian was tied, but the patient died of secondary hæmorrhage.

Neither of the first three cases, it seems to me, so far as their history is related by Poinsot, furnishes absolutely conclusive evidence that the rupture did not take place during the preliminary examination. In Korte's case one is struck with surprise that a traumatic dislocation should be reduced spontaneously. Yet I do not deny that rupture of the axillary artery may in some cases result directly from dislocation.

¹ Malgaigne, Paris ed., 1855, p. 150.

² Verduc, *Opérat. de la Chir.*, 1693, t. i. p. 559.

³ Malgaigne, *op. cit.*, p. 152.

⁴ *Mémoires sur plusieurs cas de Luxations, etc. Répertoire d'Anat. et de Phys.*, 1827, Obs. 3. Four cases of injury to the Axillary or Brachial Vessels or Nerves.

⁵ Warren, *Amer. Journ. Med. Sci.*, vol. xi., N. S., 1846.

⁶ Gibson, *Elements of Surg.*, vol. i. p. 824, 4th ed.

⁷ *St. Barthol. Hosp. Rep.*, 1866, vol. iii. p. 96.

⁸ *Med. Times and Gaz.*, Feb. 1, 1873.

⁹ Panas, *Bull. Soc. Chir. de Paris*, 1877, p. 193.

¹⁰ Berard, *Ibid.*, p. 193.

¹¹ Adams, *The Lancet*, 1880, vol. ii. p. 260.

¹² Le Dentu, *Ibid.*, p. 187.

¹³ Korte, *loc. cit.*

Rupture of the Axillary Vein.—Froriep attempted the reduction of the shoulder in a woman, æt. 36, the dislocation having existed twenty days. The axillary vein was torn entirely across, and death ensued in an hour and a half.¹

A woman came under the observation of Price² who had an old dislocation of the shoulder. Reduction having been effected, she died the next day in consequence of a rupture of the axillary vein.

Hailey³ reduced a dislocation easily, but two months later a tumor appeared in the axilla, the patient succumbed to pyæmia, and the autopsy disclosed a rupture of the axillary vein.

Professor D. H. Agnew, of the University of Pennsylvania, ruptured the axillary vein while attempting to reduce a dislocation of six weeks. The woman, æt. 60, had a subcoracoid dislocation, and while the arm was lifted and extension made according to La Mothe's method, the vein was ruptured, causing a very large tumor covering the entire breast. Compresses and bandages were at once applied and continued for several weeks, the case resulting in a complete cure, but with the bone unreduced.⁴

Rupture of Artery and Vein.—Platner mentions a case of rupture of both artery and vein, in which death ensued from subsequent rupture of the sac.⁵

Charles Bell reports a case in which the artery was ruptured, at the New Castle Infirmary, and the parts adjacent so much injured that immediate amputation became necessary. It seems quite probable therefore that the vein was also torn, but this is not stated.⁶

Dr. H. B. Sands, of New York, in attempting to reduce a downward dislocation of seven or eight weeks' standing, in a lady eighty-six years of age, found a tumor rapidly forming in the axilla, which soon attained the size of a child's head at full term; discoloration ensued, and the pulsations of the brachial, ulnar, and radial arteries were lost. She was also greatly prostrated. It was evident that some vessel had given way, but inasmuch as she finally recovered without any surgical operation, it is scarcely probable that it was, as at first suspected, a rupture of the axillary artery. I ought to add that the patient was, at the time of attempted reduction, under the influence of ether, and that great care was said to have been exercised by Dr. Sands not to employ great force in the attempt. The reduction was not accomplished.⁷

Cerebral Accidents.—In a case reported by Lisfranc, death is ascribed to cerebral congestion.⁸

Flaubert⁹ in making a second attempt to reduce a dislocation of the shoulder, caused what he supposed to be a cerebral hæmorrhage.

Poinsot, in commenting upon these cases, says that the frequency of

¹ Malgaigne, from Froriep.

² Price, quoted by Marchand, *op. cit.*, p. 63.

³ Hailey, *Brit. Med. Journ.*, 1863, vol. ii. p. 684.

⁴ Agnew, *Phila. Med. Times*, Aug. 16, 1873.

⁵ Malgaigne, Paris ed., 1855, vol. ii. p. 151.

⁶ Willard, *Summary of Cases*, *Phila. Med. Times*, Aug. 16, 1873.

⁷ Sands, *Med. Gaz.*, March 8, 1880.

⁸ Malgaigne, Paris ed., 1855, vol. ii. p. 161.

⁹ Flaubert, Marchand, *op. cit.*, p. 106.

syncope during the work of reduction has been remarked by M. Verneuil; and that M. Desprès and Gosselin have thought that dislocations of the shoulder "lend themselves badly" to the use of chloroform. Poincot farther suggests, that some of these cerebral accidents may be due to fatty emboli, or thromboses.

Injury to Axillary Nerves.—Very many accidents of this kind have happened from time to time, some of which have been reported by Flaubert, Malgaigne, Lenoir, Larrey, Nélaton, Panas, Marchand, Verneuil, and others.¹

Lesions of the Soft Parts.—Guerin tore the arm completely from the body, in an attempt to reduce a dislocation of three months' standing, in a woman 63 years of age.² Dr. Thomas Smith,³ of St. Bartholomew, London, saw in a man, æt. 58, the skin and muscles torn until the head of the bone was exposed, by simple manual extension with the heel in the axilla. The patient died on the ninth day.

Inflammation, etc.—Mr. Hutchinson, of London, reported in 1866 that inflammation, suppuration, and death had resulted from an attempt made to reduce an old dislocation of the humerus, under his own observation.⁴ A like result followed the reduction of a recent subclavicular dislocation, in the practice of Dr. Courtright, of Ohio.⁵

Trélat's⁶ patient died of inflammation caused by attempts at reduction of a subcoracoid, incomplete! dislocation. The dislocation had existed four months and had been subjected to repeated unsuccessful attempts at reduction with India-rubber lacs, Jarvis's adjuster, etc.; and Norris⁷ has seen a enormous axillary abscess caused by a successful reduction of a dislocation of seven weeks' standing. Norris's patient eventually got well.

Fracture of the Humerus.—In the following case an attempt to reduce an ancient dislocation of the humerus occasioned a fracture of the surgical neck:

Martha Hogan, æt. 70, of Brooklyn, N. Y., was admitted into the Long Island College Hospital during the spring of 1860. The dislocation had existed six weeks, and was subcoracoid. On the day of admission an attempt was made to reduce it, both by Dr. Johnson and myself, without an anæsthetic, in which we both failed. I then gave her ether, and now discovered that she had a fracture of the second and third ribs on the same side. The fractures were ununited. While manipulating, pulling the arm gently and rotating, the surgical neck of the humerus gave way. She did not survive the injury many days, and the autopsy confirmed this diagnosis.

In December, 1874, Dr. Stephen Smith, of Bellevue, met with the same accident in attempting to reduce a subglenoid dislocation of eight weeks' standing, before the class of medical students. The patient, a man aged about 40, was under the influence of ether. Manipulation and

¹ Malgaigne, Paris ed., 1855, vol. ii. p. 151. Marchand, op. cit.; Poincot, op. cit.

² S. Cooper's First Lines, vol. ii. p. 486; Amer. Journ. Med. Sci., 1828, p. 126.

³ Smith, The Lancet, 1878, vol. ii. p. 3.

⁴ Hutchinson, Lond. Hosp. Reports, vol. ii. (Cincinnati Journ. Med., Aug. 1866, p. 361).

⁵ Courtright, Cincinnati Lancet and Observer, Jan. 1877.

⁶ Trélat, Marchand, op. cit., p. 114.

⁷ Norris, Amer. Journ. Med. Sci., vol. xxxvi. p. 24.

extension had been freely employed in various directions, but the fracture took place when, at my suggestion, extension was for a moment relinquished, and while Dr. Smith was rotating the humerus with the elbow at a right angle with the body.

In December, 1865, Rosanna Casey, æt. 32, was admitted to Bellevue with a subcoracoid dislocation of the left shoulder. The accident occurred six weeks before. On admission, one of the house surgeons attempted reduction, and, as I am informed, fractured the surgical neck of the humerus. After which, Dec. 9th, I attempted reduction before the class, the patient being under the influence of ether, but without success. Malgaigne has recorded four similar cases.¹

Two cases are referred to in the *Lancet*, February 6, 1876; one by Howse² and the other by Sheen³; in the latter of which, however, a suspicion is expressed that the fracture occurred at the same time as the dislocation. In my opinion the fracture was caused by the attempt at reduction.

Summary of the Graver Accidents.—Rupture of an artery, 28 cases; most of which were known to be ruptures of the axillary artery. Callender, Lister, Blackman, and Korté tied the axillary, and the patients all died. The same was the fact in the Sheffield case. Warren and Letiévant tied the subclavian artery successfully. Gibson, Gunther, and Panas, who resorted to the same operation, were unsuccessful. Nélaton tied the subclavian, but the result is not stated.

Carruther and Bellamy practised disarticulation, and their patients died. Bell did the same, but the result is not stated.

Rupture of vein alone, four cases. Price, Hailey, and Frieriep's patients died; Agnew's patient was saved.

Rupture of artery and vein. This occurred in Platner's case, and the patient died.

Rupture of unknown vessel, one case. No operation. Recovery.

Lesions of the soft parts, two cases. Two deaths.

Of the whole number, thirty-six, twenty-five terminated fatally, in four the results are uncertain, and seven recovered.

Of fractures of the neck of the humerus I have reported three cases, and I have drawn from other sources six cases, making in all nine. My own patient died, but probably not in consequence of any injury suffered in the attempt at reduction.

Norris has reported three cases of ancient dislocation into the axilla, treated at the Pennsylvania Hospital: one, of four weeks' standing, was reduced in thirty seconds by the aid of pulleys; the second, which had existed seven weeks, was reduced by the same means in about one hour; and the third, dislocated ten weeks, was left unreduced after extension and counter-extension had been made for an hour. In the second case, however, suppuration occurred in or about the joint, and, on the tenth day, the abscess was opened, giving exit to a large amount of pus. He left the hospital with the parts about the shoulder still much hardened and stiff.⁴

¹ Malgaigne, Paris ed., 1855, vol. ii. p. 143.

² Howse, The Lancet, 1876, vol. i. p. 212, from Guy's Hosp. Gaz. 1876.

³ Sheen, Ibid., p. 211.

⁴ Norris, Amer. Journ. Med. Sci., vol. xxxi. p. 24.

Dislocations, with Fracture of the Humerus near its Upper End.—I have thus far omitted to speak of the treatment of dislocations of the humerus accompanied with fracture near its upper end. The older writers, almost without an exception, agree in declaring the reduction of these dislocations impossible, until the fracture had united. And, so late as the year 1828, we have the report of a case treated in this manner by a surgeon in Massachusetts. Dr. Warren, of Boston, himself reduced the dislocation at the end of four weeks, when the fracture was found to have united.¹ But since the introduction of anæsthetics, immediate attempts at reduction have more often proved successful; and in no case can the surgeon excuse himself for having omitted to make the effort.

Richet reports an example of this kind in a man sixty-eight years of age, in whom the dislocation was complicated with a fracture of the neck of the humerus. The attempt was not made until the fourth day, when it proved successful without extension. The fracture was afterwards adjusted and consolidated, so that he recovered the complete use of his arm.²

At a meeting of the New York Academy of Medicine in May, 1855, Dr. Watson reported a case of fracture of the humerus near its head, complicated with a dislocation into the axilla. The patient was a robust man, past middle age, and had received the injury by a blow on the shoulder from a steam-engine. He was very much prostrated at the time of admission into the hospital, and the examination was not made until the following morning. The arm was then found lying close to the side, but in other respects it presented the usual signs of a dislocation. Ether was immediately administered; and while extension and counter-extension were applied, and a sweeping motion given to the arm, drawing it from the body, firm pressure with the fingers was made in the axilla, forcing the head toward the socket, and the bone slipped into its position.³

In the *Transactions of the American Medical Association*, I have reported a case of supposed dislocation, accompanied with a fracture, which I succeeded in reducing on the eighth day.⁴

I have, however, twice failed in attempts to reduce similar dislocations.

The first patient, John Riley, æt. 49, was admitted to Bellevue Hospital, March 29, 1864, having received the injury two days before. The dislocation was subcoracoid, and the humerus was broken at its surgical neck. Having placed him under the influence of ether, assisted by Dr. Stephen Smith and several other surgeons of the hospital, I attempted to reduce the dislocated bone, but after a trial, prolonged through one hour or more, the effort was abandoned.

The second case was in a man aged about forty years, who was admitted to Bellevue Hospital in July, 1864, with a dislocation of the head of the humerus forwards, and a fracture of the surgical neck, of four weeks'

¹ Boston Med and Surg. Journ., No. 1, 1828; also, Amer. Journ. Med. Sci., vol. ii. p. 233.

² Richet, Amer. Journ. Med. Sci., vol. xii., new ser., p. 293, from Bulletin de Thérap.

³ Watson, Amer. Journ. Med. Sci., vol. xvi., new ser., p. 333.

⁴ Op. cit., vol. ix. p. 93.

standing. A surgeon had attempted reduction immediately after the receipt of the injury, but had failed. We found the fracture still ununited, and placing him under the influence of ether, we tried faithfully, by pushing and pulling, and by various other manœuvres, to reduce the dislocation, but without success.

The fractures united in both cases promptly, and attempts were subsequently made to reduce the dislocation, but to no purpose.

Examples have been recorded, however, by surgeons, in which the reduction has been accomplished immediately, and without much difficulty, by simple pressure upon the head of the bone while the patient was under the influence of an anæsthetic, and without the aid of extension; indeed, it is quite doubtful whether extension in these cases is of any service. I have already said that I have once succeeded in replacing the head in its socket after the lapse of eight days. But if the surgeon were to fail by pressure alone, it would be proper to employ extension, especially with abduction, and manipulation.¹ In the event of a failure by these means, the case ought to be treated as a fracture, and the earliest period after the union of the fragments should be seized upon to accomplish the reduction of the dislocation. The occasional success of the older surgeons by this method is sufficient to warrant the attempt.

Compound dislocations of this joint will be discussed in a separate chapter devoted to the general consideration of compound dislocations of all the joints connected with the long bones.

§ 2. Dislocations of the Humerus Forwards. (Subcoracoid and Subclavicular.)

Causes.—The causes of this dislocation are the same as those which produce dislocation downwards into the axilla, except that it is more likely to occur in a fall upon the elbow or upon the hand when the line of the axis of the arm and forearm is thrown behind the body. Where my records have stated the cause, it has been ascribed to a direct blow upon the shoulder sixteen times, and to a fall upon the hand or elbow only twice. If it is the result of a direct blow, the impulse has usually been received rather upon the back than upon the outer side of the head of the humerus; or the upper end of the bone, having been originally thrown directly downwards upon the inferior edge of the scapula, may have been made to assume the position forwards, beneath the pectoral muscle, in consequence of the peculiar action of the muscles, or of the position of the arm in an attempt to rise. By this latter mode of explanation, the dislocation forwards is consecutive only upon a dislocation downwards.

In several instances which have come under my notice the dislocation has been due to muscular action alone. In one example the dislocation occurred frequently in consequence of epileptic convulsions. This was in the person of a lad, æt. 18, of a slender frame and feeble muscles. When the dislocation had taken place, he was frequently able to reduce it himself; sometimes he was obliged to call upon a surgeon, and at

¹ Hartshorne, Case reduced by Manipulation, Amer. Journ. Med. Sci., Jan. 1855, pp. 273-4, from Med. Examiner.