

resuming its position suddenly and with a sound. The reduction may, nevertheless, be facilitated by bending the trunk backwards, or by directing the patient to make a full inspiration.

To maintain the reduction has been found more difficult, and Sir Astley directs that "a long piece of wetted pasteboard should be placed in the course of three of the ribs and their cartilages, the injured rib being in the centre; this dries upon the chest, takes the exact form of the parts, prevents motion, and affords the same support as a splint upon a fractured limb. A flannel roller is to be applied over this splint, and a system of depletion pursued, to prevent inflammation of the thoracic viscera." Instead of the pasteboard, we might use either felt, sole-leather, or gutta-percha.

The patients spoken of by Ravaton and Manzotti were both cured in about one month.

Mr. Bransby Cooper says that a baker's boy applied for relief at Guy's Hospital, who was the subject of displacement of the cartilages of the fifth and sixth ribs from their junction with the sternum, produced partly by the constant action of the pectoral muscles in kneading bread, but principally by his defective constitution. Mr. Cooper stated to the boy the necessity of changing his occupation, and advised him to go into the country; but as he was unable to do so, little hope was entertained of his recovery.¹

(The outer extremities of these cartilages being continuous with the bony structure of the rib, and destitute therefore of articular or synovial surfaces, may be subject to fracture, but not, properly speaking, to dislocation.)

§ 3. Dislocations of one Cartilage upon Another.

The cartilages on the sixth, seventh, and eight ribs are furnished at their lower borders with a true arthrodial joint, by which they articulate with the corresponding cartilages. This arrangement sometimes extends to the fifth and ninth ribs.

A displacement of these articulations may take place when one falls upon his back, striking upon some projecting body, so that the chest is suddenly thrown forwards; in consequence of which the upper margin of the lower cartilage is depressed and entangled behind the lower margin of the upper. The inferior cartilage is, therefore, the one which is displaced rather than the superior, although this latter, being made prominent by the pressure of the other from behind, seems alone to be displaced. Boyer, Martin, and Malgaigne² have each reported one example.

It is probable that the contraction of the pectoral and abdominal muscles has a chief agency in the production of these dislocations, and that they are not solely or directly due to the shock of the accident.

The treatment consists in pressing firmly upwards and backwards against the inferior margin of the upper, or overlapping rib, so as to disengage it from the lower, when by its own elasticity it will resume its natural position. The reduction might also be aided by a full inspiration.

¹ B. Cooper's ed. of Sir Astley Cooper, etc., op. cit., p. 447.

² Malgaigne, op. cit., p. 398.

CHAPTER VI.

DISLOCATIONS OF THE CLAVICLE.

OF 57 dislocations of the clavicle observed and recorded by me, 13 belonged to the sternal end and 44 to the acromial. Of those belonging to the sternal end, 11 were dislocations forwards, forwards and upwards, or forwards and downwards, and 2 were upwards. I have never met with a dislocation backwards. Of the acromial dislocations the whole number were dislocations upwards, or upwards and outwards.

§ 1. Sterno-Clavicular.

(a) DISLOCATIONS OF THE STERNAL END OF THE CLAVICLE FORWARDS.

Causes.—This accident is generally caused by a fall upon the point—outer surface—of the shoulder, in consequence of which the sternal end of the clavicle is driven forcibly inwards and forwards. It is probable, also, that the blow which produces the dislocation is received rather upon the anterior and outer than exactly upon the outer face of the shoulder. A sudden effort of the muscles, as in the attempt to balance a weight upon the head, or to throw the shoulders backwards when under drill, has been known also to produce this dislocation. In one example it was occasioned by placing the knee against the spine and drawing the shoulders forcibly back. Various other accidents, the philosophy of whose agency is not so easily explained, are said to have produced the same result; but it is not improbable that in many of these cases the precise manner in which the injury was received has not been correctly understood or reported.

Mr. Fergusson has once seen this displacement in a newly born infant, which had happened during birth. It could be replaced with ease, but immediately slipped out again when left to itself. "Nothing was done; a new joint formed, and the child afterwards possessed as much power in the one arm as in the other;"¹ and Dr. W. C. Shaw, of Pittsburg, Pa., has also seen a congenital case.²

The following is an example of double forward dislocation at the sternal end: Agnes Moriarty, æt. 17, in a collision on the Third Avenue Elevated Railroad, March 25, 1879, was thrown violently, it is supposed, against the door, striking her left shoulder, and then by a rebound striking the floor of the car with the right shoulder. By courtesy of Drs. McGuire and King, her attending surgeons, I saw her on the fourth day after the accident. Exposing her shoulders, we observed an extensive ecchymosis on the outer surface of the right shoulder, extending some distance down

¹ Fergusson, System of Practical Surgery, Amer. ed., 1853, p. 203.

² Shaw, Med. Record, Aug. 18, 1877.

the arm. While seated in a chair both clavicles were subluxated forwards and a little upwards, the right ascending a little higher than the left. She could not raise her arms to her head; but when lifted to this position the dislocations became complete, and when let fall the bones would resume their positions of subluxation with a click. The bones could not be pushed completely into their sockets, and pulling the shoulders back increased the displacement; but when lying flat on her back they went nearly into place. At my suggestion, she was kept in this position six weeks, but with no result; the bones still becoming displaced whenever she got up. Some months after the accident she was still suffering from the general disturbance to her spine and nervous system caused by the shock, and the arms had not recovered their original strength.

It seems probable, from the history of the case as subsequently ascertained, that there had existed prior to the accident a laxity of the capsule, permitting of the existence of a partial displacement, and which was rendered complete by the traumatism.

Symptoms.—The head of the bone, unless the person is exceedingly fat, or great swelling has supervened, can be distinctly felt and seen in front of the sternum; the corresponding shoulder falls a little back; the head inclines also sometimes to the same side; the movements of the arm are embarrassed, and accompanied almost always with an acute pain at the point of dislocation. The clavicular portion of the sterno-cleido-mastoid muscle presents an unusually sharp and projecting outline, and a careful measurement indicates, if the dislocation is complete, a sensible approach of the acromion process toward the centre of the sternum. If now the surgeon places his knee against the spine, and draws the shoulders back, the projection of the clavicle in front usually diminishes or disappears; if he carries the shoulder up, it descends; and if he depresses the shoulder, it ascends.

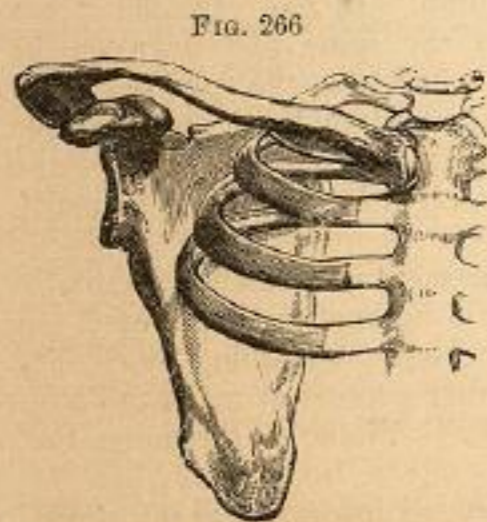


FIG. 266
Dislocation of the sternal end forwards.

The simplicity and uniformity of the symptoms which usually characterize this accident will generally prevent the possibility of a mistake; but Pinel mentions the case of a man who, having presented himself at one of the hospitals of Paris, suffering under this dislocation, the surgeon-in-chief thought it a tumor of the bone, and advised the application of a plaster; and, on the other hand, a patient presented himself to Velpeau, who had been treated for a dislocation, when the bone was only expanded by disease. I have myself also seen a fracture so near the sternal end of the bone as not to be easily distinguished from a dislocation.

Pathology.—In complete anterior dislocation of the clavicle, the capsular ligament suffers a complete disruption, and also the anterior with the posterior sterno-clavicular ligaments. The rhomboid and interarticular ligaments suffer more or less, according to the extent of the displace-

ment. The interarticular cartilage may retain its attachment to the sternum, or it may be carried forwards with the clavicle. The head of the bone lies immediately underneath the skin and in front of the sternum; and generally it is found to have descended a little upon its anterior surface. Richerand saw a case in which the sternal extremity of the bone was placed three inches below the top of the sternum. In some cases it is situated in front and a little above the sternum.

Wherever the bone lies, it carries with it the clavicular fasciculus of the sterno-cleido-mastoid muscle.

Treatment.—Not one of the 11 forward dislocations of the clavicle at the sternal end seen by me has been completely reduced, or if reduced they have not been retained in place. In the following example the reduction, although faithfully attempted, was never accomplished.

Mr. H., of Buffalo, *æt.* 45, was thrown by a horse, suffering at the same moment a fracture of the leg and a forward dislocation of the left clavicle at its sternal end.

Prof. James P. White, with whom I was in consultation, made several attempts to reduce the dislocation by placing the knee against the spine and pulling the shoulder forcibly back, and the same efforts were repeated by myself, but without accomplishing the reduction. We also endeavored to reduce it by pressing directly upon the projecting bone and by placing a pad in the axilla, using the arm as a lever, as recommended by Desault, and with no better result.

The patient was tolerably muscular, but while we were manipulating he was very much enfeebled by the shock of the accident.

Finding that it was impossible to reduce the dislocation by any moderate amount of force, and believing that if it were to succeed we could not retain the bone in place, and the more especially because his left side was so much bruised that he could not bear an axillary pad or bandages of any kind, we desisted from any further attempts.

Two years later I examined the shoulder and found the clavicle still unreduced, and its position unchanged. When he carries the shoulder forwards or backwards, there is a corresponding motion at the sternal end of the clavicle. The arm is not quite as strong as the other, and its freedom of motion is slightly impaired.

I have also in my museum the cast of a case of complete forward dislocation at this point; which accident occurred in a lad twelve years old, who had fallen into a cellar on the 20th of August, 1856. The late Dr. Lewis and Dr. Dayton, both excellent surgeons, had examined the arm, and dressings had been applied with a view to maintain the reduction; but on the fifth day after the accident I found the bone displaced; nor do I think reduction was ever afterwards maintained.

A lad was brought into the Buffalo Hospital of the Sisters of Charity, with a dislocation of the same character, on the 25th of Sept. 1858, who had been run over by a wagon on the same day. Dr. E. P. Smith, one of the surgeons of the hospital, attempted faithfully to reduce it, but was unable to do so. Five days after, I found the bone out and quite movable. All apparatus having been removed, we laid him upon his back in bed, and kept him in this position three weeks. He was then dismissed with no change in the appearance of the bone, but he could move the arm as well as before the accident.

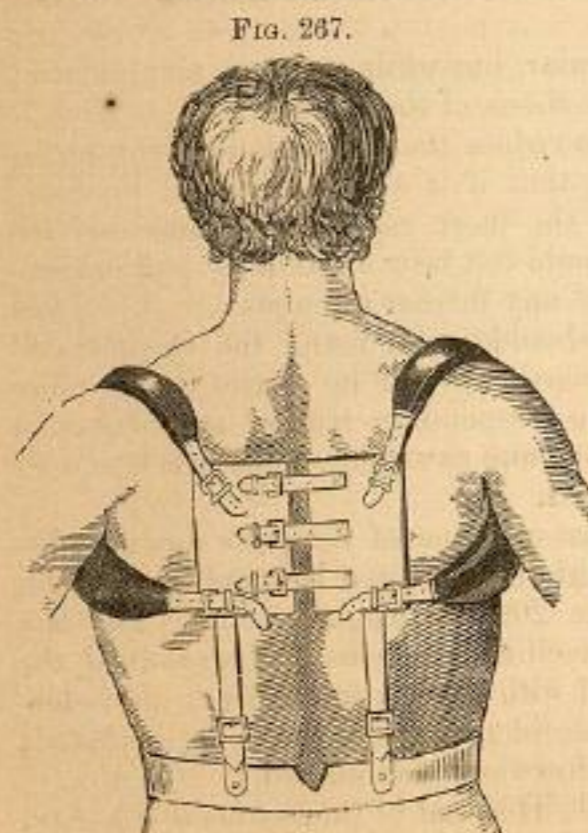
Other surgeons have not met with, or, at least, they have not mentioned, any cases in which the reduction of this dislocation was attended with difficulty, nor am I prepared to explain the difficulty which was experienced in my own (Mr. H.), and in Dr. E. P. Smith's case. Unless it be as suggested by Sédillot, and as illustrated by Smith's case of dislocation upwards hereafter to be mentioned, that the reduction was prevented by the displacement of the interarticular cartilage. But most surgeons have testified to the difficulty of retaining it in place when reduction has been fairly accomplished. Chelius says, "there commonly remains more or less deformity," and Malgaigne says that "it is difficult and rare to cure it without deformity."

Nevertheless, Desault (or, rather, his pupil Bichat, who has published his lectures), who always speaks very confidently of his ability to retain either broken or dislocated bones in their places, says that he "almost always obtained complete success" with his apparatus. It is remarkable, however, that of the three examples furnished by Bichat to confirm this statement, all of which were treated by Desault himself, one recovered after a long time with a "very perceptible protuberance in front of the sternum," one with a "very slight protuberance," and in the other the "swelling was almost gone" on the twentieth day, and we are left in doubt as to whether the reduction was any more complete than in either

of the other cases.¹ Richerand and Guersant succeeded no better with Desault's dressings.²

Other surgeons have made similar claims for their own forms of apparatus, but experience still continues to show that a complete retention of the dislocated bone is seldom to be expected.

Sir Astley Cooper recommends an apparatus, the construction and application of which are illustrated by the accompanying sketch, the object of which is to draw the shoulders back, and at the same time, by the aid of two pads or cushions in the axillæ, to carry the shoulders outwards. The dressing is then completed by placing the arm in a sling. He advises, however, that in some way direct pressure should be made upon the projecting point of bone.



Sir Astley Cooper's apparatus for dislocated clavicle.

Velpeau objects to any plan which will draw the shoulders back; but, on the contrary, he thinks that the shoulders should be kept slightly forwards, so as to diminish the

¹ Desault on Fractures and Dislocations, by Xav. Bichat, Philada. ed., 1805, p. 52.
² Malgaigne, op. cit., tom. ii. p. 417.

tendency of the sternal end of the clavicle to escape in this direction.

Until further observations have determined the relative value of these and of many other processes, it will be well to adopt no fixed rule of action; but having reduced the bone by either placing the knee upon the spine and drawing the shoulders back, or by making use of the humerus as a lever, the surgeon should attempt to maintain it in place by such means as the experiment shall prove are most successful. Among these means, direct pressure upon the sternal end of the clavicle, the sling, and perfect quietude of the muscles of the arm through the aid of bandages, with the dorsal decubitus, are no doubt of the greatest importance. If we find that a position of the shoulders more or less forwards or backwards best maintains the apposition, this position, whatever it is, ought to be continued.

In order to be successful, sufficient time must elapse for the torn ligaments to become firmly reunited, during which the reduction must be constant; since every time the bone escapes, the whole work of repair has to be recommenced as from the beginning. To this end at least four or six weeks are necessary, and sometimes the period must be lengthened far beyond these limits; so that it may often become a grave point of inquiry whether the long confinement of the limb will not entail more serious consequences than have ever been known to arise from leaving the bone displaced. In no case seen by me has the function of the arm been very seriously impaired by the displacement.

(b) DISLOCATIONS OF THE STERNAL END OF THE CLAVICLE UPWARDS.

R. W. Smith¹ has furnished us with an account of one example of this dislocation as seen in the dissection. The extremity of the left clavicle rested upon the sternum, and had passed the median line until it touched the sterno-cleido-mastoid muscle of the right side. Posteriorly it rested upon the sterno-hyoideus muscle and the front of the trachea. The anterior and posterior ligaments of the joint, as well as the rhomboid ligaments, were torn. The interarticular cartilage was detached from the sternum and the cartilage of the first rib, and had followed the clavicle.

Malgaigne has collected four undoubted examples of this dislocation. Mr. Bryant mentions two cases seen by himself, one of which was a double dislocation. He refers also to a specimen in Guy's Museum, dislocated upwards and forwards.² Dr. Shaw, of Pittsburg, Pa., has reported one case in an adult caused by a fall.³ Vanvert has reported a case, in the *Gazette des Hôpitaux*, caused by a blow upon the side of the chest, which he was unable to reduce.⁴ I have been unable to find a report of any other except the very extraordinary case described by Dr. Rochester, at the September meeting of the Buffalo Medical Asso-

¹ Smith, Dublin Journ. of Med. Sci., Dec. 1872.

² Bryant, Practice of Surgery, p. 787, London, 1872.

³ Shaw, Med. Record, Aug. 18, 1877.

⁴ Vanvert, New York Med. Journ., March, 1879, p. 329.

ciation, and which case, through the courtesy of Dr. Rochester, I was permitted to see several times.¹

Jerry McAuliffe, æt. 44, on the 28th of August, 1858, while seated upon a load of wood, was caught under the bar of a gateway and violently crushed, the right shoulder being forced downwards and a little backwards. Dr. Rochester saw him very soon after the accident. On examination, it was found that the sternal extremity of the right clavicle was thrown upwards so far as to rest upon the front of the thyroid cartilage, occasioning considerable pain, difficulty of respiration, and loss of speech. Reduction was easily effected, and a retentive apparatus was immediately applied, consisting of a gutta-percha splint, moulded to the clavicle and ribs, and retained in place with adhesive plaster. Suitable bandages, a sling, etc., were also employed to maintain complete rest.

Notwithstanding all the care employed, the bone again became displaced, and when, nearly four months after the accident, this man came before the class of medical students at the Hospital of the Sisters of Charity, we found the sternal end of the clavicle carried upwards half an inch, and across toward the opposite side also about half an inch, and projecting somewhat in front. It was fixed in this position by ligaments which allowed it to move much more freely than natural, but which would not permit any great displacement. The corresponding shoulder was slightly depressed. McAuliffe said that he felt no inconvenience or abatement of strength in the arm except when he attempted to lift weights above his head.

In April, 1870, I met with a similar case in a woman fifty years of age, which had been caused by a fall upon the shoulders nine weeks before, and which had been overlooked by her surgeon in the first instance. When seen by me it was immovably fixed in its new position.

The accident seems to have been produced, in all the cases, so far as can be ascertained, by a force operating upon the end and top of the shoulder; in consequence of which the head of the clavicle is pushed and at the same time lifted, as it were, from its socket, tearing not only its capsule with the ligaments which immediately invest the capsule, but also in some instances the costo-clavicular ligament with some fibres of the subclavian muscle. The sternal end of the clavicle is found riding upon the top of the sternum, its head being placed between the sternal fasciculus of the sterno-cleido-mastoid muscle on the one hand, and the sterno-hyoid muscle on the other. In one of the cases seen by Malgaigne, the head had traversed in this direction completely the intra-clavicular space, and lay behind the sternal portion of the opposite sterno-cleido-mastoid muscle.

Symptoms.—The symptoms are, a depression of the shoulder, with an elevation of the sternal end of the clavicle so as to increase sensibly the space between it and the first rib. The clavicle also encroaches more or less upon the supra-sternal fossa, occasioning a corresponding diminution of the space between the end of the shoulder and the centre of the sternum. The sternal portion of one or both of the sterno-cleido-mastoid

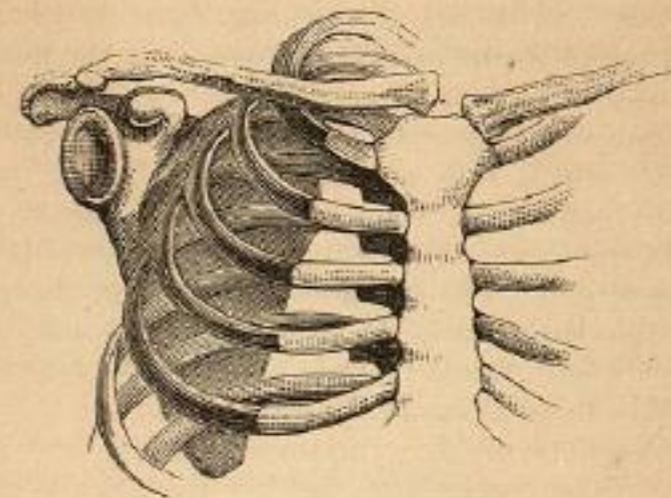
¹ Rochester, Buffalo Med. Journ., vol. xiv. p. 262

muscles may also be seen raised and rendered tense by the pressure of the head of the bone from behind.

Treatment.—Reduction has been found easy, but Malgaigne thinks a perfect retention impossible—at least it does not seem to have been accomplished in any of the cases reported. In no case did the displacement seriously impair the functions of the arm.

The same apparatus to which I shall give the preference in cases of dislocation upwards of the acromial end of the clavicle, at least with

FIG. 268.



Dislocation of the sternal end of the clavicle upwards.

only such slight modifications as the peculiarities of the case will naturally suggest, will be suitable for this accident. The shoulder must be lifted by a sling, while the sternal end of the clavicle is pressed downwards by a pad and bandages; and all the muscles of the arm and chest, so far as is consistent with respiration and comfort, must be maintained in a state of perfect rest until the ligaments have become reunited.

(c) DISLOCATIONS OF THE STERNAL END OF THE CLAVICLE BACKWARDS.

The first case upon record of this kind of accident, caused by violence, was published by Pellioux, in 1834, in the *Revue Médicale*; until which time its existence had been generally denied. In the *London and Edinburgh Journal of Medical Science* for October, 1841, several cases are mentioned.

Two forms of the accident have been described; one in which the head of the clavicle is driven backwards and a little downwards, and another in which it is displaced directly backwards, or backwards and a little upwards. In both of these classes, the end of the bone falls inwards toward the opposite clavicle, and occupies a space in the cellular tissue back of the sterno-hyoid and sterno-thyroid muscles, and in front of the œsophagus; the trachea, if reached at all, being probably thrust to the opposite side.

The examples in which it has been found below the top of the sternum are much the most numerous; indeed, it is probable that the other form

is only a secondary displacement, occasioned by the action of the fibres of the sterno-cleido-mastoid muscle.

Causes.—Of the eleven examples mentioned by Malgaigne, four were occasioned by direct blows, and most of the remainder by crushing accidents, as by powerful lateral compression of the shoulders.

One of the cases produced by a direct blow was accompanied with an external wound, and is the only instance of a compound dislocation of this kind which I have found upon record. The man was admitted into St. Thomas's Hospital in Sept. 1835, and, according to his own account, the sharp end of a pickaxe had been driven through the flesh against the bone. The sternal end of the clavicle was found to be displaced backwards, and with the finger thrust into the wound on the front of the chest, it could be distinctly felt resting upon the side and front of the trachea, where it interfered somewhat with respiration and deglutition. He had a great desire to cough, with a sensation of pressure on his windpipe, which was greatly increased when his head was thrown back. There was also a slight emphysema in the region below the collar-bone and over the top of the sternum. The shoulder having been brought back with straps attached to a back-board, the bone readily resumed its place. The elbow was then brought forwards and bound to the side, and the wound being closed with adhesive plaster, he was put to bed with the shoulders much raised. No unfavorable symptoms followed, and in three weeks he left his bed. Three weeks later he left the hospital with the sternal end of the bone still falling a little backwards, and rather more movable than natural.¹

The following example, related by Morel-Lavallée, will illustrate that class in which the dislocation results from an indirect blow, or from a crushing accident.

Lemoine, seventeen years old, had his right shoulder violently pressed against a wall by a carriage. He experienced at the moment some pain at the bottom of his neck, and a great sensation of suffocation, which lasted for more than a quarter of an hour. The dyspnoea gradually subsided, but the motion of the right arm not returning, he, on the eighth day after the accident, entered La Charité. On examination, the two shoulders were found to be on the same level, but the right one was nearer the median line. The internal extremity of the clavicle was half concealed behind the sternum. On depressing the shoulder, the inner end of the clavicle arose and disengaged itself from behind the sternum; but reduction was effected by elevating the shoulder, while at the same time it was carried outwards and backwards. Desault's bandage was then applied, but as it became loosened Velpeau's was substituted, which kept the bone completely in position until the eighteenth day, when the patient was lost sight of.²

Symptoms.—The most constant symptoms are, the absence of the head of the bone from its socket, and its complete or partial disappearance behind the sternum, an approach of the corresponding shoulder to the median line, an inclination of the head to the opposite side, elevation

¹ South, note to Chelius's Surgery, Amer. ed., vol. ii. p. 218.

² Morel-Lavallée, Amer. Journ. Med. Sci., vol. xxix. p. 229, 1842; from Gaz. Méd.

of the shoulder, pain at the bottom of the neck, impairment of the motions of the arm, sometimes difficulty in respiration and in deglutition, partial arrest in the circulation of the arm from pressure upon the subclavian artery, and a slight projection of the acromial end of the clavicle, noticed twice by Morel-Lavallée.

Treatment.—It has not generally been found difficult to reduce this dislocation, nor, when reduced, is it so liable to become again displaced as are the dislocations forwards; yet in only a few instances has the restoration been so complete as not to leave some deformity.

In order to the reduction, the shoulder must be carried generally upwards, outwards, and backwards; and it may then be best maintained in position by laying the patient on his back upon an elevated cushion, as practised by Tyrrell in the case related by South. To this may be added such other measures, differing but little from those employed in other dislocations of the clavicle, as are necessary to insure complete rest to the muscles. Of course, no pads or bands across the clavicle can be of any service in this case.

As in the other cases of dislocation at this point, the patients have generally recovered nearly the full use of their arms, even in one or two instances in which the reduction has never been accomplished.

§ 2. Acromio-Clavicular.

(a) DISLOCATIONS OF THE ACROMIAL END OF THE CLAVICLE UPWARDS.

Of all the dislocations of the clavicle, this form is most frequent. I have met with it either as a partial or complete traumatic luxation forty-three times. The youngest subject was seven years of age, and the oldest sixty-three. All but two were males.

I have seen one example of congenital complete upward and outward dislocation of the acromial end, which was not traumatic—the case of Mary Ann Hughes, who was examined by me Feb. 8, 1876, when she was four weeks old. The labor had been easy and natural, and there was no soreness over the joint. It was easily reduced, but could not be maintained in place.

Causes.—It is produced generally by a fall upon the extremity of the shoulder. Twice the blow has been received rather upon the back than upon the extremity, and once it was occasioned by the fall of a board directly upon the top of the shoulder, and once by a bolt thrust directly up from under the clavicle.

Symptoms.—When the dislocation is complete, the clavicle not only is lifted from its articular facet to the extent of the breadth of the bone, but it is pushed more or less outwards over the top of the acromion process; generally less than half an inch, but I have once seen it riding the process to the extent of three-quarters of an inch. In this last example, the case of James Moran, a strong, healthy laboring man, the clavicle was easily reduced, and it always went into place with a sensible click; but although every possible care was taken to retain it in place by bandages, compresses, an axillary pad, and a sling, yet it was not accom-

plished, and on the third day he removed all the dressings, and refused to have them reapplied.

I have usually found the shoulder slightly depressed; and in one instance, where it is probable the deltoid muscle had suffered some injury, the elbow hung away from the body, and any attempts to lay it against the side produced an acute pain in the shoulder.¹ It has been noticed also, in most cases, that the clavicular portion of the trapezius muscle appeared lifted and tense, especially when the neck was straight.

Inability to raise the arm to a right angle with the body is a general but not constant symptom. In two instances, where the displacement was only moderate, the patients were at first and for some time afterwards unable to lift the arm in any degree from the side. In one example, a lady sixty years of age had fallen upon her shoulder and produced a dislocation upwards, but she had not consulted a surgeon until she called upon me, five months after the accident. The clavicle was then raised from its socket about half an inch, but it could be easily pressed back to its place, the reduction being attended with a grating sensation, a circumstance which I have not noticed in any other instance. She was not even then able to raise her arm to her head, nor had she been able to do so since the accident occurred.

In all the motions of the arm and shoulder, the clavicle is seen to move more freely than natural immediately under the skin, and these motions are usually attended with some pain at the point of dislocation.

This accident has been sometimes mistaken for a dislocation of the humerus, but, unless the shoulder is already greatly swollen, the error is not likely to happen. If the point of the acromion process can be made out, it will be easy to determine, by sliding the finger along its spine, whether the clavicle is displaced or not, and by these means to settle the question of its complicity in the accident. The question as to whether the shoulder is dislocated or not may be more difficult of solution, as we shall hereafter have occasion again to observe.

Pathology.—Generally there exists simply a rupture of the ligaments immediately investing the joint, so that the clavicle rises from its socket only about half an inch, more or less, according to its diameter, and is carried outwards just sufficiently far to allow it to rest upon the upper margin of the acromial articulation. In at least thirty of the cases seen by me this has been the position of the acromial end of the clavicle, and for its complete reduction nothing more has been required than to press with moderate force upon the upper and outer end of the bone.

In nine cases I have found the bone not only thus lifted in its socket, but also driven over upon the acromion process from half to three-quarters of an inch; and in one instance, that of a gentleman, Mr. B., who was injured in a railroad accident, the acromial end of the clavicle was displaced outwards half an inch and backwards three-quarters of an inch, while the sternal end also was considerably lifted in its socket and slightly sent inwards. The shoulder fell forwards and the coracoid process was one inch nearer the sternum than the same process upon the

¹ Report on Dislocations, by the author. Transac. of New York State Med. Soc. 1855, p. 19.

opposite side. In such cases more or less of the fibres of the coraco-clavicular ligament must have suffered a disruption; indeed, without a rupture of its external fasciculus, which anatomists have called the trapezoid ligament, such a dislocation cannot take place.

M. Nicaise¹ has reported a case analogous to the above, in which he was unable to effect reduction; and he has added the results of his experiments upon the cadaver, which confirm the statement already made by me, that this dislocation cannot take place without a rupture of the trapezoid ligament.

Prognosis.—It is impossible for me to say what has been the precise result in all the cases which I have seen, but my notes furnish only two cases of perfect retention after a complete dislocation at this point. One

FIG. 269.



Dislocation of the acromial end of the clavicle upwards.

FIG. 270.



Dislocation of the acromial end of the clavicle upwards and outwards.

of these, David Thomas, aged about twenty-five years, fell sideways upon the ground, striking upon the extremity, and, as he thinks, a little upon the top of the shoulder. The clavicle was dislocated upwards and outwards, so that it overlapped the acromion process half an inch. It was easily replaced, and having applied my own apparatus for broken collar-bones, with the addition of a band across the shoulder and under the elbow to keep the clavicle down, I succeeded in retaining the bone in place. This dressing was continued until the forty-second day, when, on being removed, the clavicle was seen to be closely confined upon its articulation; and after a lapse of two years it still retains its position so completely that no difference can be detected between the opposite articulations.

In the case of Moran, already mentioned, whose clavicle overlapped the acromion process three-quarters of an inch, and who threw off the dressings at the end of three days, the same degree of displacement ex-

¹ Nicaise, The Lancet, Oct. 14, 1856, vol. 2, p. 535.

isted at the end of two years; the scapular end of the clavicle moving freely in every direction under the skin according as the arm was moved. In lifting, he says, the strength of his arm is undiminished until he raises the weight nearly to a level with his shoulders, and from this point upwards he can lift but little. For a laboring man it amounts to a serious maiming. I have seen the same loss of power in the arm to raise bodies above the head in at least two or three of the examples of less complete dislocation, continuing after the lapse of several years; but in the majority of cases, although the bone does not remain reduced, the patients have recovered eventually the complete use of the arm in whatever position it may be placed.

The case to which I have already referred as having been caused by a bolt thrust upwards under the clavicle, will furnish the best illustration of this general principle. James O'Brien, 1st U. S. Artillery, was injured in September, 1862, by being run over by a horse-car. A bolt, three-quarters of an inch in diameter, was driven through the skin on the anterior margin of the left axilla, breaking the first rib, severing the coraco-clavicular ligaments, and forcing the clavicle upwards from its socket. No attempt at reduction was ever made. When seen by me one year after the accident, the outer end of the clavicle was lifted directly up two inches from the acromion process, to which it was united only by a long and slender ligament. He was not conscious of any loss of power or limitation of motion in the injured arm. At my request, my son, then in the U. S. service, instituted a series of experiments to test the relative strength of the two arms, and with the following result: First with the right arm, and then with the left, he lifted from the ground fifty-six pounds and three ounces, and sustained this weight above his head thirty seconds, with his arms fully extended. With his right arm extended at full length, at right angles with his body, he sustained twenty-five pounds for fifteen seconds. With the left arm he sustained the same weight, in the same position, seventeen seconds.¹

Treatment.—When the bone simply rises upon its socket, the reduction is always easily accomplished by pressing firmly upon its extremity with the fingers; but if, at the same time, it has been carried outwards, or outwards and backwards, the reduction is only accomplished by pulling the shoulders backwards, or by placing a pad in the axilla, using the arm as a lever, or by lifting the arm by the elbow and at the same time pressing the clavicle down; and it will sometimes require the application of all or several of these procedures at the same moment. In some cases the complete reduction has only been effected when the patient has been brought under the influence of an anæsthetic.

As to the maintenance of the bone in its socket for a length of time sufficient to insure a firm and close union of the torn ligaments and capsule, this will be found always more difficult, and, in a great majority of cases, absolutely impossible. Nearly all surgeons who have written upon this subject have made the same observation; and if occasionally a new apparatus in the hands of a clever surgeon has seemed to promise better results, the same apparatus in the hands of other equally clever

¹ Amer. Med. Times, Oct. 24, 1863.

surgeons, and under circumstances equally favorable, has been found almost constantly to fail; and we have been compelled again to exercise anew our ingenuity, and to seek for new resources, or to abandon the effort in despair.

Dr. Folts, of Boston, believed that he had found in Bartlett's apparatus for broken clavicles, modified by the application of a shoulder-strap, the infallible remedy for this one of the many sad defects in our art. The most important part of this dressing, according to Dr. Folts, is the compress placed upon the upper and outer end of the clavicle, and the bandage or strap passed over the compress and under the point of the elbow.¹

Dr. Folts is no doubt correct in regarding this strap as an important if not the essential part of the apparatus; and it is surprising that by Sir Astley Cooper, as well as by many other experienced surgeons, its value should have been overlooked. The chief obstacle to the retention of the bone in place is the powerful action of the trapezius, which constantly tends to elevate the outer end of the bone. In some measure this may be overcome by elevating very forcibly the shoulder, or by inclining the head, but both of these positions are extremely fatiguing, and will not be long endured. The bandage or strap, adjusted in the manner which Dr. Folts has recommended, is the only means of counteracting the action of the trapezius, upon which any substantial reliance can be placed; but the principle has long been understood and practised upon. Brasdor's tourniquet, or Petit's, secured by a strap brought under the point of the elbow, Boyer's double shoulder-straps, and Desault's third bandage, all aimed at the accomplishment of the same purpose; yet Boyer and Desault found all these contrivances fail in a majority of cases. Mayor employed a dressing constructed with a strap to buckle over the dislocated clavicle; but Nélaton has seen this apparatus fail also, when applied in his own wards.

The experience of Dr. Folts at the time of his report did not extend beyond three cases, and the apparatus had been completely successful in only two of the three. My own experience is sufficient to show that it will be found occasionally, but by no means constantly, successful. I have already mentioned two cases in which I succeeded perfectly by this mode, but in several others which seemed equally favorable I have met with partial or complete failures.

The source of error, generally, on the part of those who think that they have devised an apparatus, or a method by which they can always or generally succeed in holding the bone in place until the ligaments are reconstructed, is, first, that they have not sufficiently noted how slight is the elevation, or projection, in a large majority of cases, before any dressing is applied, so that finding eventually very little projection, they call it perfect; second, that they examine the shoulder, to determine whether the restoration is complete, too soon after the apparel is removed, when a very slight remaining effusion into, and induration of the adjacent tissues, render it impossible to say what has been accomplished; and third, they have sometimes had under treatment too small a number

¹ Folts, Boston Med. and Surg. Journ., vol. llii. p. 259.

of cases to entitle them to form a just conclusion as to the general value of their method of treatment.

The practical difficulties are, the sensibility and consequent inability sometimes of the point of the elbow to bear the requisite pressure, and the even greater sensibility of the skin over the top of the clavicle; the tendency of the bandage to slide off from the shoulder, and also to become displaced from the end of the elbow; the gradual relaxation of the bandages, which, when existing even in the most inconsiderable degree, is sufficient sometimes to allow the bone to slip out from its shallow socket; the impossibility of fixing the scapula, upon whose immobility as well as upon the immobility of the clavicle the retention depends; and, finally, the great length of time requisite to unite firmly the ligaments, if indeed they ever again become actually united.

The band can be prevented in some measure from sliding off from the clavicle by a counter-band attached to a collar upon the opposite shoulder, but not without causing some pain, and giving rise to excoriations generally in the opposite axilla; and, in a degree, all the other difficulties

FIG. 271.



Mayor's apparatus for dislocated clavicle.
("Triangle cubito-bis-scapulaire.")

may be met by patience and ingenuity, but unfortunately the smallest failure in any one of these numerous indications insures a defeat.

The axillary pad employed as a fulcrum upon which extension may be made is equally as dangerous here as in fractures, and I do not think it ought ever to be used for this purpose, but only as a means of moderate support and retention; indeed it would be well, perhaps, if it were discarded altogether.

The case of Mr. B., already quoted, with a dislocation outwards and backwards, affords not only an illustration of the inefficiency of either the shoulder-strap or the axillary pad in certain cases, but also, it seems to me, of the mischief which may

result from their too diligent application; for I cannot persuade myself but that most of the maiming in this case was due to the apparatus rather than to the original accident.

This gentleman was injured on the 10th of November, 1855. A sling with an axillary pad and bandages was immediately applied. I saw him on the seventeenth day. The displacement was then such as I have described, but I did not observe any paralysis or emaciation of the limb. Having noticed that the clavicle fell into its socket when he lay upon his back in bed, at my suggestion all the dressings except the sling were removed, and the patient laid upon his back in bed, with instructions to

continue in this position, if possible, until the cure was complete; but after a few days I received a communication from his physician, stating that, owing to a troublesome cough, he had found it impossible to maintain this position. His residence was forty or fifty miles from town, and I sent him one of my dressings for broken collar-bones, with instructions as to its use; directing especially that a shoulder-strap should be used to keep the clavicle down.

The dressing was applied and continued six weeks, and on being removed, the elbow, wrist, and finger-joints were found to be stiff. The whole arm was emaciated and almost powerless. One year later there was no improvement in the condition of the arm; every joint from the shoulder down was almost completely ankylosed, the muscles were greatly wasted, and the hand trembled constantly.

These results, it seems to me, were due to too long and too tight bandaging of the arm, and especially to the pressure of the axillary pad. I do not state this positively, but this is my belief.

Is it worth while, then, to incur the dangers of too long confinement and of excessive bandaging for the purpose of attaining the always uncertain result of maintaining the bone in its socket? We certainly may be permitted to make the attempt within certain reasonable limits; and especially if the patient is a female, and the avoidance of deformity is a point of serious consideration; but never without keeping constantly in mind the possibility of a permanent ankylosis and paralysis of the limb.

Dr. Gross says he first suggested the use of strong silver wire to keep the parts in place, and this suggestion was carried into effect by Dr. Cooper, of San Francisco, and by Dr. Hodgen, of St. Louis.¹

Dr. Hodgen informs me under date of January 29, 1881, that he has made the operation twice, and that both resulted well, the parts being kept well in position; but that with his present experience he would not repeat the operation, except in cases of *very great* displacement. In this latter opinion, as to the circumstances under which alone the operation would be justifiable, I fully concur; and even in such a case its propriety is questionable.

(b) DISLOCATIONS OF THE ACROMIAL END OF THE CLAVICLE DOWNWARDS.

This form of dislocation is exceedingly rare, only five well-authenticated cases are known to me as having been placed upon record, one of which was seen and dissected by Melle in 1765, the second was met with by Fleury in 1816, and the third is described by Tournel.

Dr. Walter B. Chase, of Brooklyn, N. Y., has reported a case in a boy 8 years old, who fell headforemost Aug. 15, 1877, twelve or fifteen feet, striking the top of his shoulder upon the round of a ladder. The patient was thin, and the exact position of the clavicle was easily traced. The axis of the bone was changed, carrying the acromial end downwards and a little backwards. The anterior portion of the shoulder was flat-

¹ Hodgen, Amer. Journ. Med. Sci., April, 1876, p. 452; Ibid. April, 1861, p. 389.

tened, and the acromion process was very prominent. He could move the arm slightly when it hung by his side.

The boy was anaesthetized, and the reduction easily effected "by throwing the shoulder outwards and backwards, while at the same time I grasped the clavicle in its outer third with the extremities of my fingers and thumb, and carried it upwards and forwards into its normal position. There was no subsequent tendency to displacement."¹

Dr. Allen² has seen a case of dislocation downwards in a boy, aet. 16, who was in good health and vigorous. The dislocation had been caused while splitting wood with an axe, the arm being elevated and carried slightly outwards. There ensued disturbance of motion and of sensibility in the arm, which Dr. Allen ascribed to pressure upon the nerves. Under the use of electricity these disturbances disappeared, and the cure was complete.

Cause.—So far as I can ascertain, except in the case reported by Dr. Allen, it has been produced by a force which has acted directly upon the top of the clavicle. In the case mentioned by Tournel, a horse had trod upon the shoulder; and in the example recorded by Melle, the accident occurred in a child six years old, from an attempt to support a great weight upon the top of the collar-bone. In this last example the humerus was dislocated also, and both dislocations had remained unreduced many years when the patient was seen by Melle.

This force acting directly upon the top of the clavicle would fail to dislocate the bone, except by first breaking down the coracoid process, if it did not happen sometimes that at the same moment the lower angle of the scapula was thrown outwards, in such a manner as to depress slightly the coracoid process, and thus to permit the outer end of the clavicle to fall below the level of the acromion process.

Symptoms and Pathology.—This dislocation, whether it has been produced artificially upon the dead subject, or accidentally upon the living, has always been found to be accompanied with a complete rupture of the acromio-clavicular ligaments not only, but also of the coraco-acromial and coraco-clavicular ligaments; the outer extremity of the bone resting between the acromion process and the capsule of the shoulder-joint, and a little posterior to the articulating facet which originally received the clavicle.

The superior angle of the scapula approaches the body slightly, and its inferior angle is thrown outwards. A marked depression exists at the point of dislocation, accompanied with a sharp pain, increased especially when an attempt is made to move the arm. The patient is unable to lift the arm voluntarily, but it can be moved pretty freely in the direction forwards and backwards by the hands of the surgeon; abduction is much more difficult.

Treatment.—Reduction is easily accomplished. At least, in all of the examples presented in the living subject, and referred to above, where the attempt was made, it was effected promptly by drawing the shoulders outwards and backwards; nor has it been found any more difficult to maintain

¹ Chase, Transactions Med. Soc. State of New York, 1879, p. 174.

² J. L. Allen, Med. Record, Feb. 19, 1881.

it in position when once replaced. When the scapula is restored to its natural position, and its lower angle approaches again the side of the body, a redislocation becomes impossible; since the coracoid process now effectually prevents that descent of the clavicle upon which its displacement always depends. It is only necessary, therefore, to secure the scapula at its base and lower angle snugly to the body, by a broad band and compress, and all the indications of treatment are completely fulfilled.

(c) DISLOCATIONS OF THE ACROMIAL END OF THE CLAVICLE UNDER THE CORACOID PROCESS.

Pinjou met with one example of this singular dislocation,¹ and Godemer, of Mayenne, has recorded five more,² and these constitute the whole number which are at this day known to science.

Cause.—Age and a consequent relaxation of the ligaments seem to constitute a predisposing cause, since of the six recorded examples four were between the ages of sixty-seven and seventy-one, and the other two were adults. In all the cases, also, the dislocations were the results of falls upon the shoulder.

The symptoms which have been said to characterize this accident are pain and a very marked depression at the point of displacement, with a corresponding projection of the acromion and coracoid processes; a rapid inclination outwards and downwards of the line of the clavicle, its outer extremity being felt in the axilla; the corresponding shoulder depressed and inclined forwards; freedom of motion in all directions except inwards and upwards; the lower angle of the scapula thrown outwards and backwards; to which Morel-Lavallée has added an actual increase of space between the acromion process and the sternum.

Treatment.—Godemer reduced all the examples which came under his notice easily, by directing an assistant to pull the arm backwards and outwards while he himself seized upon the clavicle with his fingers, and disengaged it from under the process; but Pinjou, after many efforts by the same method, failed completely, and the patient having left him, the clavicle was reduced the next day by an empiric. Vidal (de Cassis) recommends that instead of pulling the arm outwards, by which procedure the pectoralis major is made to antagonize the surgeon, the elbow shall be brought down to the side, and kept there by the left hand, while the right hand, placed in the axilla, shall pull the upper end of the humerus outwards, converting the arm into a lever of the third kind. This process, I confess, seems to be much the most rational.

Finally, having given the history of these cases as they have been reported, the author will scarcely have performed his duty as a faithful writer if he does not state frankly that he entertains a suspicion that both the gentlemen who have reported these curious examples have entertained us with fabulous or imaginary stories; and especially do these suspicions rest upon the cases reported by Godemer, who in five years saw five cases, each presenting throughout the same class of symptoms, the same

¹ Pinjou, Journ. de Méd. de Lyon, Juillet, 1842, from Vidal (de Cassis).

² Godemer, Recueil des travaux de la Soc. Méd. d'Indre et Loire, 1843, from Vidal.

facility of reduction, accomplished by the same means, and always with the same perfect result.

If to these singular coincidences we add the fact that only one other surgeon has ever claimed to have met with the accident, and if we notice the actual anatomical difficulties which stand in the way of its occurrence, such especially as the complete occlusion of the subcoracoidean space by the tendons and muscles which pass from its extremity toward the chest and arm, we shall find a fair apology for some degree of scepticism.

(d) DISLOCATIONS OF THE CLAVICLE AT BOTH ENDS, SIMULTANEOUSLY.

On the 26th of January, 1863, Dr. North, of Brooklyn, N. Y., was called to see a lad fourteen years of age, who had been thrown with violence backwards from a stool upon which he was sitting, striking the back of his left shoulder against the floor. Dr. North found him suffering severely from pain, and with some difficulty of breathing. The shoulder was depressed and thrown forwards. The sternal end of the clavicle, turned forwards, formed an abrupt, rounded prominence; the acromial end, turned forwards also, presented its longest diameter toward the surface, and rested above the acromion process; while the central portion seemed depressed or thrown back, an appearance which was caused by the rotation of the clavicle upon its axis.

Reduction was accomplished by throwing the shoulders forcibly backwards, and at the same time pressing with the thumbs upon the two extremities in such a manner as to reverse the rotation, as follows: pressing at the acromial end backwards and downwards, and at the sternal end backwards and upwards. The restoration was complete, and the bones were retained in place by compresses and adhesive plaster, with the aid of Day's "neck yoke." At the end of three weeks the dressings were removed; and when last seen by his surgeon "there was but little, if any trace of the accident remaining." It is the opinion of Dr. North that the rotation was caused by the action of the pectoralis major and deltoid after the dislocation took place.¹

Erichsen says that Richerand and Morel-Lavallée have each reported one example of double dislocation of the clavicle. Another example has been reported by Dr. Col.²

In a case observed by Lund,³ and reported by Jones, the patient, a man 32 years of age, was struck on the posterior portion of the right shoulder, dislocating the sternal end of the right clavicle forwards, and the acromial extremity upwards and backwards. It was found impossible to reduce the dislocation except under the influence of an anæsthetic. In a few days the functions of the arm were completely restored.

Rombeau⁴ met with a similar case, which is reported by Gros. The dislocation, having been first recognized several days after the accident, was reduced and maintained by an apparatus similar to that of Desault, which remained in place five weeks. Ultimately the patient recovered

¹ N. L. North, M.D., New York Med. Record, April 16, 1866.

² Col. Gaz. des Hôpitaux, 1872, p. 893.

³ Lund, Brit. Med. Journ., 1874, No. 682, p. 106.

⁴ Rombeau, Bull. Gén. de Thérapeutique, 1874, vol. lxxxvi. p. 537.

with slight remaining deformity, and with the motions of the arm completely restored.

Dr. Stanley Haynes, of Malvern Link, has reported the only remaining case of which I have been able to find a record.

"A girl, aged 13, rapidly growing, of lax tissues, and of a consumptive family, but who had always had good health, while washing the back of her neck with her left hand, one morning in September, felt something give away in the shoulder of the same side. I found dislocation forwards of the sternal end of the clavicle and partial dislocation upwards of the acromial one. There was very little pain. Both extremities of the bone were easily replaced by drawing the shoulder backwards and downwards, but the double deformity was reproduced immediately the shoulder was liberated. A pad was applied under a figure-of-8 bandage over the sternal end, and the arm was placed in a sling as a temporary measure. To a strap, fastening round the chest, a strap bearing a truss-pad was attached in such a manner that the pad kept the sternal end of the clavicle reduced, the other end of the strap passing over the shoulder and diagonally across the back to the horizontal strap: the wearing of a sling kept the acromial end in its natural position. The patient soon afterwards returned to school at a distance. She is now at home, and I have found the sling has been discontinued some time; that the straps have stretched and are useless; and that the ends of the bone are as mobile as, but not more than, they were when I first saw the patient, but that the sternal end does not become dislocated unless the arm is raised, when it nearly always starts forwards."¹

CHAPTER VII.

DISLOCATIONS OF THE SHOULDER (SCAPULO-HUMERAL.)

OWING to the great exposure and the peculiar anatomical structure of the shoulder-joint, its structure having reference mainly to freedom of motion rather than to firmness and security in the articulation, dislocations of the humerus are very common.

My private and hospital records furnish me with 117 cases of dislocation of the shoulder, seen and recorded by myself. Of these, 41 were recognized as subglenoid, 33 as subcoracoid, a very small proportion as subclavicular, 2 as subspinous, and the remainder were not accurately diagnosticated.

Writers have not been agreed as to the precise anatomical relations of these dislocations, nor as to the nomenclature. Velpeau, Malgaigne, Vidal (de Cassis), Skey, and Sir Astley Cooper have each adopted explanations and classifications peculiar to themselves. With the arrangement established by this latter surgeon, English and American students

¹ The British Medical Journal, Jan. 27, 1872.