

violently upon the palm of his hand. The forearm was slightly flexed, and could not be moved from this position without causing great pain. The coronoid process rested in the olecranon fossa, and the head of the radius in the coronoid fossa. With slight traction the ulna was reduced, and afterwards the radius was reduced by methodic processes.

M. Mayer reported a case which was not recognized until the fourteenth day, and then he found himself unable to reduce it.¹

Denucé mentions these three cases and no others.

Tillaux² also saw a case, of eight days' standing, in a girl 22 years of age, which he was unable to reduce. Minich,³ in a case which came under his observation, reduced the ulna easily, but did not succeed in reducing the radius until he had made several attempts. Minich, in his report of this case, refers to three other cases as having been seen by Vignolo, Bardeleben, and Chevalier.

Poinsot has also reported a case seen by his colleague Arnoz, which was accompanied with a fracture of the internal condyle, but which for that reason cannot be considered as representing a true dislocation.

To these cases I will add the case reported by Dr. Erskine Mason as having been seen by himself and Dr. Whybrew. The man was 28 years old, and the accident had happened in a fall when he was intoxicated. He had supposed it was a sprain, and these gentlemen were not consulted until the eighteenth day. The character of the dislocation was apparent, but they could not positively determine but that a portion of the external condyle had been broken off; there was, however, no crepitus. The limb was nearly straight, and would admit of but slight flexion. Under ether, prolonged efforts at reduction were made, with the result of finally reducing the ulna, but the radius remained unreduced.⁴

(b) TRANSVERSE. ULNA INWARDS, AND RADIUS OUTWARDS.

The following case, reported by Warmont, was presented in the service of Guersant,⁵ at the Hôpital des Enfants, June 29, 1854. A boy, 15 years old, had fallen a few feet, striking upon the palm of his left hand. The elbow was enormously swollen; its transverse diameter was much increased, while the antero-posterior seemed flattened. No abnormal protrusion existed in front, but externally the head of the radius projected, having ascended along the external border of the humerus. The olecranon was displaced inwards, so that the inner condyle was embraced by the great sigmoid cavity. Between the bones of the forearm, thus separated, almost the whole of the articular surface of the humerus was lodged. The forearm was semiflexed, and semipronated.

(c) OBLIQUE. ULNA BACKWARDS, AND RADIUS OUTWARDS.

Samuel Withe⁶ has described the case of a boy æt. 13, who had fallen violently upon his left elbow. "The condyles of the humerus protruded

¹ Michaux, Bulley, Mayer. From Malgaigne, Paris ed., 1855, vol. ii. p. 631.

² Tillaux, Gaz. des Hôp., 1877, No. 99.

³ Minich, Lo Sperimentale, 1880, fas. 6.

⁴ Mason and Whybrew, Med. Rec., April 10, 1880, p. 297.

⁵ Warmont, Rev. Med.-Chir., t. 16, p. 303.

⁶ Withe, A. Cooper, Euv. Chir. ed. de Chassaignac, et Richelot, Paris, 1837.

through the skin at the internal portion of the articulation, exposing entirely the trochlea of the humerus; the ulna was dislocated backwards, and the radius outwards." Reduction was easily effected and a satisfactory result ensued.

(d) OBLIQUE. ULNA FORWARDS, AND RADIUS OUTWARDS.

Mahner Mons' witnessed this dislocation in a man who had struck his elbow violently against a wooden obstacle while it was in a position of forced flexion. The ulna was displaced forwards without fracture of the olecranon, the radius was completely displaced outwards. Reduction was easily effected by traction and pronation. The cure was effected in two months.

CHAPTER XI.

DISLOCATIONS OF THE WRIST (RADIO-CARPAL).

REGARDED as an accident of not unusual occurrence by Hippocrates, J. L. Petit, Duverney, Boyer, and by most if not all of the older writers, its frequency began to be questioned by Pouteau, and finally its existence was almost absolutely denied by Dupuytren, who remarks: "I have for a long time publicly taught that fractures of the carpal end of the radius are extremely common; that I had always found those supposed dislocations of the wrist turn out to be fractures; and that, in spite of all which has been said upon the subject, I have never met with, or heard of, one single well-authenticated and convincing case of the dislocation in question." Dupuytren subsequently declared that he would not positively deny the possibility of the accident, yet that "it must at least be admitted that the accident is an extremely rare one." Wishing to explain this infrequency, he says: "In examining the structure of the soft parts, one cannot fail to perceive that it is not the ligaments which prevent the displacement of the articular surface forwards, but that this effect is especially due to the multitude of flexor tendons, deprived as they are at this point of all the fleshy parts, and reduced to the simple fibrous tissue which composes them. These tendons are bound together beneath the anterior annular ligament of the wrist, and thus offer so efficient a resistance that severe falls are insufficient to tear them through; the hand is forced into a state of extreme extension, and the tendons are firmly applied on the anterior part of the radio-carpal articulation. If the extension is still further augmented, the wrist-joint is yet more closely clasped by these parts, and their power of resistance is incalculable; I am convinced that a force equivalent to one thousand pounds weight would be inadequate to overcome it; and the known power of the tendo Achillis is sufficient to prove that this computation is not exaggerated.

¹ Mahner Mons, Deut. Milit. Zeitschr., 1877, Hft. 8 u. 9, p. 401.

"The risk of dislocation backwards by a fall on the dorsal surface of the hand is equally precluded by the tendons of the extensor muscles. Their arrangement and relations at the back of the joint are similar; it is true, they are not quite so strong; but we must admit that their power of resistance is very considerable, when we take into consideration how they are inclosed in sheaths as they cross beneath the posterior annular ligament of the wrist. I have not alluded to the ulna, for it has really little or nothing to do with these movements, as it does not articulate (directly) with the hand.

"To sum up, then, the extreme rarity of dislocation forwards or backwards is owing to the obstacles opposed by the flexor or extensor tendons."

The opinion of such a writer as Dupuytren, whose experience was very great, and who described only what he had seen, is always entitled to profound respect; yet it has been the practice of nearly all who have made any reference to his opinions in this matter to speak of them lightly, and not a few have falsely represented him as saying that a dislocation was "impossible." The fact is, that surgeons do still constantly mistake fractures of the lower end of the radius for dislocations, as my own personal observations can attest; and notwithstanding examples have been reported by René, Marjorlin, Padiou, Cruveilhier, Voillemier, Poincot, Malgaigne, Scoutetten, Bransby Cooper, Fergusson, W. Parker, and others, yet the whole number of cases for which the distinction is claimed is, to this day, so inconsiderable as only to establish the value and accuracy of Dupuytren's opinion that the "accident is an extremely rare one." But it is, perhaps, most remarkable, that while very few of these supposed examples have been permitted to be examined after death, in a large majority of the cases in which the autopsy has been made, the dislocation has been found to be complicated with a fracture, generally of the lower extremity of the radius or of the styloid apophysis of the ulna.

The existence of a complication, however, does not render the accident any the less a dislocation, although it may render the diagnosis more difficult, and modify somewhat the indications of treatment. A knowledge of the fact, also, that such complications have always been observed in the autopsy, may leave us in doubt as to what is the natural history of a simple uncomplicated dislocation, if, indeed, it does not warrant a suspicion that such a case never occurs. We shall, nevertheless, after a careful analysis of the cases as they have been reported, and by a consideration of the anatomy of this articulation, be able to determine with some degree of accuracy, perhaps, what are, or what ought to be, the usual causes, signs, treatment, etc., of these accidents.

Partial dislocations have also been frequently described by surgeons. I have never met with an example, but the following case, related to me by the patient himself, I believe to have been a case in point.

Lewis C., of Buffalo, *et.* 18, by a fall upon his hand, broke the left forearm below the middle, and at the same time, as he affirms, partially dislocated the carpal bones backwards. Dr. Spaulding, of Williams-ville, N. Y., took charge of the limb, and pronounced it a fracture, with partial dislocation, and for more than a year after the accident the bones had a tendency to become displaced in the same direction. When-

ever he attempted to lift even the weight of half a pound, with his hand supinated and his forearm extended horizontally, the lower end of the radius would spring suddenly forwards, and all power in the arm would be lost. When this happened, as it did quite often, he always reduced the bones himself, by simply pushing upon them in the direction of the articulation.

Fourteen years after the accident, I examined the arm and found it in all respects perfect, except that the forearm was shortened about one-third of an inch, which shortening was due, no doubt, to the overlapping of the broken bones.

I am unable to verify the accuracy of the statements made in the following paragraph; but as there seems to be no reason why they should not be accepted, it will be proper to give them a place in this treatise.

"According to Francis L. Parker, M.D., Professor of Anatomy in the Medical College of South Carolina (*Trans. S. C. Med. Assoc.*), there are thirty-three cases of so-called dislocations of the wrist-joint on record (omitting the cases of W. Parker and René), including his own, viz., case of dislocation of the wrist-joint backwards. Of these, twenty-three are said to have been dislocated backwards and ten forwards; of this entire number only seven, five backwards and two forwards, are free from all objection. Of the twenty-six cases of doubtful or unsatisfactory dislocations, sixteen were complicated with fracture of one of the bones or processes connected with the joint; three were compound, three were incomplete, two were arthritic or pathological specimens, and two were objected to from other causes. Of the thirty-three so-called dislocations, the sex is recorded here in fourteen instances; of these eleven were males and three were females. Of the seven cases classed as genuine ones, one post-mortem was made (case of M. Malle), which confirmed the diagnosis; in six remaining cases the patients regained the use of the limb in a very short time, without a tendency to displacement or deformity. Of these seven cases accepted as genuine, two backward dislocations were produced, the force of the fall being received, in one instance, on the dorsum of the hand (Hamilton's); in the other upon the palmar surface (Parker's); in M. Malle's case, a forward displacement, the presumption is that the patient fell on the palm of his hand, but this is not definitely stated; and in the four remaining cases this point is not specified. He lays down the following practical conclusions, which may be derived therefrom: 1st. The wrist-joint may be dislocated backwards or forwards without fracture or a rupture of the integuments; both are extremely rare; the backward displacement is the most frequent. 2d. Cases of so-called dislocation of the wrist may be associated with fracture of the radius and ulna, or with either of these bones separately, with both styloid processes, or either of them, or with fracture of the articulating surface of the radius; no instance has been recorded of a dislocation of this joint complicated with fracture of the carpal bones. 3d. Dislocation of the wrist backwards or forwards may be complicated with rupture of the integuments anteriorly or posteriorly, or laterally, with or without fracture of the styloid processes."¹

¹ F. L. Parker, *Med. Rec.*, Nov. 1, 1871.

§ 1. Dislocations of the Carpal Bones Backwards.

Causes.—The same casualty, namely, a fall upon the palm of the hand, which, as we have elsewhere noticed, produces frequently a fracture of the lower end of the radius, occasionally a dislocation of the radius and ulna backwards, at the elbow-joint, may also, it is believed, occasion sometimes a dislocation of the carpal bones backwards. In several of the cases reported, this cause has been assigned; but in the only example of simple dislocation which has ever come under my notice, and which I have every reason to believe was a simple dislocation unaccompanied with a fracture, the carpal bones were thrown back by a fall upon the back of the hand. The following is a brief account of the case:

The Rev. Stephen Porter, of Geneva, N. Y., *æt.* 75, while walking with his son after dark, and holding in his right hand a satchel, slipped and fell. In the effort to save himself, and still retaining his grasp upon the satchel, his right hand struck the sidewalk flexed, and in such a way that the whole force of the fall was received upon the back of the hand and wrist, thus throwing the hand into a state of extreme flexion. In less than twenty minutes he was at my house. No swelling had yet occurred, and the moment I looked at the wrist I said to him, "You have broken your arm; so much did it resemble a fracture of the lower end of the radius. A further examination led me to a different conclusion. The palmar surface of the wrist presented an abrupt rising near the radio-carpal articulation, the summit of which was on the same plane and continuous with the bones of the forearm, and a corresponding elevation existed upon the dorsal surface terminating in the carpal bones and hand; the hand was slightly inclined backwards, but the fingers were moderately flexed upon the palm. To this extent the accident bore the features of a fracture of the radius; but the hand did not fall to the radial side; the projections upon the palmar and dorsal surfaces were more abrupt than I had ever seen in a case of fracture, and which, if it were a fracture, would imply that the broken extremities had been driven off from each other completely; the most salient angles of these projections were abrupt, but not sharp or ragged; the styloid apophyses could be distinctly felt, and I was not only able to determine that they were not broken, but, by observing their relations to the palmar and dorsal eminences, it was easy to see that these latter corresponded to the situation of the articulation.

In addition to these evidences that I had to deal with a dislocation, and not a fracture, I had the testimony furnished by the reduction, which was not made, however, until by every possible means the diagnosis was definitely settled. Seizing the hand of the gentleman with my own hand, palm to palm, and making moderate but steady extension in a straight line, the bones suddenly resumed their places with the usual sensation or sound accompanying reductions. There was no grating, or chafing, or crushing, nor was the reduction accomplished gradually, but suddenly. To test still further the accuracy of the diagnosis, I now pressed forcibly upon the wrist from before back, but without producing

any degree of displacement, nor could any crepitus still be detected. No splint was applied, and on the following morning Mr. Porter preached from one of the pulpits in the city, only retaining his arm in a sling.

Sixteen months after the accident, September 15, 1858, this gentleman again called upon me, and I found the arm perfect in all respects, except that it was not quite as strong as before; the lower extremity of the ulna was preternaturally movable, and occasionally he felt a sudden slipping in the radio-carpal articulation.

Pathological Anatomy.—In the examples of compound or complicated dislocations, which have been exposed by dissections, the posterior and lateral ligaments have been found extensively torn, as also frequently the anterior ligament, with or without separation of the radial or ulnar apophyses; the extensor muscles torn up from the lower part of the forearm and displaced; the first row of the carpal bones lying underneath

FIG. 304.



Dislocation of the carpal bones backwards. (From Fergusson.)

the tendons, and upon the bones of the forearm, sometimes having been carried directly upwards, sometimes upwards and a little inwards, and at other times upwards and outwards; the arteries and nerves have occasionally escaped serious injury, but more often they have been displaced, bruised, or torn asunder.

Such are, briefly, the pathological circumstances which may be supposed to exist, also, in a lesser or greater degree, in nearly all cases of simple dislocations.

In compound dislocations, however, the muscles, or rather the tendons, are twisted, torn, and thrust aside, producing very extensive lesions among the deeper structures of the forearm and hand before the integuments can be made to yield.

On the 2d of May, 1852, Silas Usher, *æt.* 54, had his right arm caught between the bumpers of two cars, bruising the hand and dislocating the carpal bones backwards, the radius and ulna being thrown forwards and pushed completely through the skin into the palm of the hand. Most of the flexor tendons had been merely thrust aside, but one or two were torn asunder; the median nerve was torn off, but the radial and ulnar nerves were apparently uninjured, and there was no fracture.

The patient being a temperate man, in perfect health, and the bones having been easily replaced by moderate extension, it was determined to make an effort to save the arm. The limb was therefore laid on a carefully padded splint, and cool water lotions diligently applied. Phlegmonous erysipelas began to develop itself on the third day; and on the ninth, gangrene having attacked the limb, I amputated a little above the middle of the humerus. On the fourteenth day hæmorrhage occurred suddenly from the stump, and when I reached him he was pulseless and dying.

The result demonstrated the error of the attempt to save the limb without resection of the lower ends of the bones of the forearm. I will also add, that according to my later experience it would have been better, if an attempt were to be made to save the hand without resection, to have used warm instead of cold water, and when gangrene occurred, to have applied hot water, or water at a temperature of 105° or 110° F., either in the form of fomentation or a bath.

Symptoms.—The usual signs have already been sufficiently stated in the example which I have given. The most important diagnostic

FIG. 305.



Dislocation of the carpal bones backwards.

marks are found in the abruptness of the angles formed by the projecting bones; the relation of these prominences to the styloid apophyses; in the total absence of crepitus; and in the reduction, which is accomplished easily, suddenly, and with a characteristic sensation. If a fracture complicates the accident, crepitus may also be present. It should be remembered, moreover, that when the styloid process of the radius is broken, if the hand is moved backwards and forwards this process will move also, which might lead to the supposition that the radius was broken higher up, and that it was not a dislocation at all.

Prognosis.—In compound dislocations the prognosis is exceedingly grave, unless the surgeon determines to resort to amputation, or, what is generally much preferable, to resection. In dislocations complicated with fracture of the posterior edge of the articulating surface of the radius ("Barton's fracture"¹), some difficulty may be experienced in retaining the bones in place; but when this fracture does not exist, the posterior margin of the articulation, considerably elevated above its anterior margin, constitutes a sufficient protection against a redislocation in that direction. In all cases, also, complicated with fracture, even of an apophysis, intense inflammation and swelling are likely to follow, and the danger of a permanent ankylosis is greatly increased.

Treatment.—Extension in a straight line has generally been found sufficient to accomplish the reduction; to which may be added a slight rocking or lateral motion, if necessary.

The reduction may be effected also by pressing the hand backwards,

¹ Philadelphia Medical Examiner, 1838.

while the surgeon pushes the carpus downwards from behind and above, in the direction of the articulation.

Unless a tendency to displacement exists, no splints or bandages of any kind ought to be applied, but the case should be treated by rest and fomentations until all danger from inflammation has passed.

§ 2. Dislocations of the Carpal Bones Forwards.

The causes, mechanism, symptoms, pathology, treatment, etc., of this accident resemble in so many points those of the preceding dislocation, with only the differences necessarily due to a change in the direction of the bones, that I find it not worth while to do more than to relate one single example, contained in Bransby Cooper's edition of Sir Astley's work on *Fractures and Dislocations*. The case did not come under the observation of Mr. Cooper himself, but was related to him by Mr. Haydon, a surgeon residing in London. It is especially interesting as furnishing an example of a dislocation of both wrists at the same moment, and from similar causes, but in opposite directions.

FIG. 306.



Dislocation of the carpal bones forwards.

FIG. 307.



Dislocation of the carpal bones forwards.

A lad, aged about thirteen years, was thrown violently from a horse on the 11th of June, 1840, striking upon the palms of both hands and upon his forehead. The left carpus was found to be dislocated backwards, the radius lying in front and upon the scaphoides and trapezium. The right carpus was dislocated forwards, the radius and ulna projecting posteriorly, and the bones of the carpus forming an "irregular knotty tumor terminating abruptly" anteriorly.

A very careful examination was made to determine what parts came in contact with the resisting force, but although the palms of both hands were extensively bruised, there was not the slightest bruise on the back of either hand. Nor were the gentlemen present able to find any evidence whatever that the dislocation was accompanied with a fracture. "Moreover," says Mr. Haydon, "we were strengthened in our opinion that this was a case of dislocation, unattended with any fracture, because the dislocations appeared so perfect; the two tumors in each member so

distinct; the reduction so complete; the strength of the parts after reduction so great; and lastly, by the very trifling pain felt after reduction, for within an hour after, the patient could rotate the hand, and supinate it when pronated—this could not, we believe, have been done had there existed a fracture."

CHAPTER XII.

DISLOCATIONS OF THE LOWER END OF THE ULNA (INFERIOR RADIO-ULNAR).

IN connection with fractures of the lower end of the radius this accident is not very uncommon. I have myself met with it under these circumstances several times; but without a fracture of the radius it is quite rare. Dupuytren met with but two cases in his long and extensive practice. Sir Astley Cooper does not record a single instance, and many surgeons affirm that they have never seen the dislocation in question, uncomplicated with a fracture of the radius.

§ 1. Dislocations of the Lower End of the Ulna Backwards.

Malgaigne never met with a case, but he refers to eleven or twelve examples which had been reported up to the time he wrote. I have met with three cases.

Causes.—Duges mentions the case of a little girl in whom the accident occurred in both arms, but at different periods, by being lifted by the hands. One of the patients seen by Desault, a child five years old, had the ulna dislocated backwards by extension accompanied with forced pronation; and in another example, cited by him, forced pronation alone, as in wringing wet clothes, was found to have been sufficient. In Her-teaux's case the patient had fallen upon her wrist.

Pathological Anatomy.—Rupture of the synovial membrane (saciform ligament), and also rupture of the internal lateral ligament, and of the triangular fibro-cartilage, the little head or lower extremity of the ulna abandoning its socket in the radius, and being thrown backwards, or in some cases backwards and outwards, so as to cross obliquely the lower end of the radius; or it may incline inwards as well as backwards.

House Surgeon Owen, of Bellevue Hospital, called my attention, April 4, 1869, to an example of this dislocation in ward 28. The patient, Mary Fay, æt. 27, having puerperal mania, was confined some time in February, in a strait-jacket, and the accident happened during this confinement, about six weeks before she came under my notice. I found the right ulna displaced backwards so that its articular surfaces were completely separated; but it did not override the radius and with moderate pressure it was returned to place. The dislocation and reduction, which had been frequently made by the house staff since the accident, caused no pain, but was accompanied with a slight grating sensation.

Mrs. Margaret Hogan fell upon her left hand March 3, 1882. She applied immediately to one of the city hospitals for relief, but was advised that nothing could be done. I saw her four weeks after the accident. The radius was not broken. The ulna projected backwards, and she was unable to pronate the forearm. It was easily reduced, but would not remain in place without support. She was not under my care, and I am not informed as to the treatment or its results.

Mr. Simpson, æt. 50, fell March 9, 1867, striking upon his hand and elbow, causing a fracture of the external condyle of the humerus, and a dislocation backwards of the lower end of the ulna. The dislocation was reduced promptly and easily by Dr. John Dwyer, of this city, and when I saw the patient on the following day with Dr. Dwyer, the arm was much swollen, but the ulna had remained in place without bandages or other means of support.

Prognosis.—In recent cases the reduction has generally been accomplished without difficulty, and in only three or four instances has the bone become spontaneously displaced.

Loder reduced the ulna after eight weeks, and Rognetta after sixty days. In one of the examples to which I have already referred as having been seen by myself, the dislocation had existed twenty years, the accident having occurred in Ireland when the person was fifteen years old. When I examined the arm, July 21, 1850, the right ulna projected backwards and a little outwards, about half an inch. He said he had been lame with it for several years, but the motions of the wrist-joint were now completely restored, and both pronation and supination were perfect.

Symptoms.—The hand is usually fixed in a position midway between supination and pronation. Boyer, however, found the hand in a state of extreme pronation. The extremity of the ulna is felt and seen distinctly upon the back of the wrist, prominent and movable; and the styloid process is no longer in a line with the metacarpal bone of the little finger; the fingers, hand, and forearm are slightly flexed.

Treatment.—The reduction may be accomplished by holding firmly upon the radius and at the same moment pushing the ulna forcibly toward its socket; or by simply supinating the hand strongly. Some cases demand also extension and counter-extension.

Generally the bone has been found to remain in its place without assistance, yet in three or four of the examples upon record the constant tendency to displacement when the pressure was removed has rendered it necessary to employ splints and compresses.

§ 2. Dislocations of the Lower End of the Ulna Forwards.

The dislocation forwards is said by Malgaigne to be more rare than the dislocation backwards. In addition to the nine cases collected by him, I have been able to add one reported by Parker, of Liverpool, one by R. F. Weir, of New York,¹ and one seen by myself.

While the dislocation backwards is usually caused by violent pronation

¹ Weir, Arch. Clin. Surg., April 15, 1877, p. 10.

of the hand, this dislocation is most often occasioned by violent supination. The hand is therefore generally found to be supinated forcibly, and the projection formed by the end of the bone is seen upon the front of the wrist instead of the back.

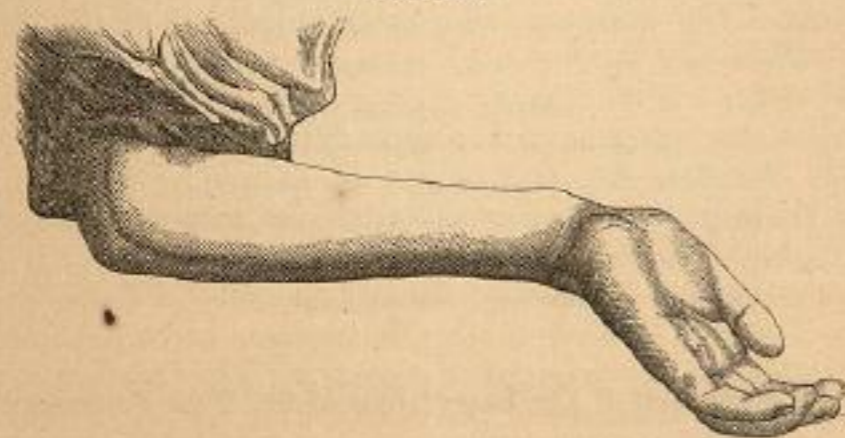
By pushing the ulna toward its socket while an attempt is made to flex the hand, or by extension, supination, etc., it is made to resume its position readily. In the case reported by Parker, however, the reduction was effected only while the hand was pronated.

Parker's case is thus related:

"John Dalton, aged forty, applied to the hospital, Aug. 9, 1841, under the following circumstances:

"States that he is a carter, and falling down, the shaft of the cart fell upon his hand and forearm, in such a way as to supinate them forcibly. He complains of pain in the left wrist. The forearm is supinated, and cannot be pronated, the attempt causing much suffering. The wrist-joint can be flexed or extended without much pain. On looking at the back of the wrist, the appearance is characteristic; the natural prominence of the ulna is wanting; an evident depression exists, as if the lower end of the ulna had been dissected out; it can be traced, however, on a plane anterior to the radius, its button-like head being distinctly felt under the flexor tendons. Several ineffectual and very painful attempts were made to accomplish the reduction, by pushing the head of the ulna into its natural situation. This was at last effected by seizing the hand to make extension (counter-extension being made at the elbow), then forcibly pronating the hand, at the same time pressing backwards the dislocated head of the bone with the fingers of the left hand. After persevering for a short time, the bone was felt to assume its natural position, the wrist acquired its usual appearance, and the ordinary movements of the joint could be readily performed. There was no tendency to redislocation, and the man was dismissed with directions to keep the bone quiet,

FIG. 308.



Dislocation of lower end of ulna forwards. (Case of Wm. Carroll.)

and to foment it. He attended as an out-patient for two or three days, after which, complaining of nothing but a little weakness in the part, a bandage was applied, and ordered to be worn for a short time."¹

¹ Parker, Amer. Journ. Med. Sci., April, 1843, p. 470, from Lond. and Edin. Month. Journ. Med. Sci., Dec. 1842.

The following is the case seen by me:

Wm. Carroll, æt. 27, had his left arm caught in machinery and "twisted," or rotated violently, causing a simple dislocation of the ulna forwards. No attempt was made at reduction. He consulted me Nov. 14, 1878, several months after the accident occurred, when I found the lower end of the ulna projecting on the palmar surface, and inclined toward the radius. It could be reduced easily, but would not stay in place; pronation was lost, but all other movements of the arm were preserved. He was a laboring man, and declined to have the necessary apparatus applied to secure permanent reduction, since it would prevent his immediate return to work.

Dr. Weir's patient was a woman, æt. 49, in whom the accident occurred, Feb. 9, 1877, by a direct force applied to the back of the ulna near its lower end. She was seen within a few minutes by Dr. Weir, the wrist presenting a singular deformity. It was much narrower than the other, and in place of the usual prominence posteriorly, there was a deep depression, and the head of the ulna projected slightly in front. The hand was semiflexed and nearly supinated. An attempt to reduce the dislocation without an anæsthetic failed; but under the influence of an anæsthetic the reduction was accomplished easily, by direct pressure made upon the lower end of the ulna. The recovery of the use of the hand was speedy and complete.

I found in the Long Island College Hospital, April, 1869, a girl 13 years old, who two years before had fallen upon the palm of the right hand causing a dislocation of the lower end of the ulna. A doctor applied a splint and kept it on four weeks, but when the splint was removed the ulna became displaced as at first. When examined by me, the ulna became displaced *backwards* in the act of supination, and *forwards* in the act of pronation; in consequence of which the strength of the wrist was considerably impaired.

CHAPTER XIII.

DISLOCATIONS OF THE CARPAL BONES (AMONG THEMSELVES).

BOUND together on all sides by strong ligaments, and enjoying only a very limited degree of motion among themselves, the carpal bones seldom become displaced except in gunshot wounds, or in connection with extensive lacerations and fractures of the neighboring parts. Simple dislocations, or rather subluxations of these bones, do, however, occasionally take place, but, so far as I have been able to ascertain, except in the case of the pisiform, only in one direction, namely, backwards.

The bones of the carpus, which are said occasionally to have suffered simple backward subluxation, are the semiulnar, cuneiform, and pisiform of the first row, and the trapezium, magnum, and unciform of the second row.

Magnum.—Richerand, the editor of Boyer's Lectures, says that he once met with a subluxation of the os magnum backwards, of which he has given the following account: "Mrs. B., in a labor-pain, seized violently the edge of her mattress, and squeezed it forcibly, turning her wrist forwards; she instantly heard a slight crack, and felt some pain, to which her other sufferings did not allow her to attend. Fifteen days afterwards, happily delivered, and recovered by the care of Professor Baudelocque, she showed her left hand to this celebrated accoucheur, and expressed her disquietude about the tumor which appeared on it, especially when much bent. I was called to visit the lady. I found that this hard circumscribed tumor, which disappeared almost totally by extending the hand, was formed by the head of the os magnum, luxated backwards; I replaced it entirely by extending the hand and making gentle pressure on it. As the affection did not impede the motion of the part, as the tumor disappeared on extending the hand, and as it would have been but little apparent in any state of the hand had Mrs. B. been more in flesh, I advised her not to be uneasy about it, and to apply no remedy to it."¹

Richerand also adds that Boyer and Chopart had each met with the same dislocation.

Bransby Cooper saw the os magnum displaced backwards in a stout, muscular young man, by a fall upon the back of the hand when in extreme flexion. The hand remained slightly bent, and the projection of the os magnum was very distinct. Reduction was attempted by extending the whole hand, at the same time making pressure upon the displaced bone; this not succeeding, extension was made from the middle and fore-fingers only, while pressure was kept up on the os magnum, when suddenly the bone resumed its natural position. On flexing the hand, however, the dislocation was immediately reproduced; and it became necessary to apply a compress and splint. For several days after, he was in the habit of pushing it out by flexing the hand, in order that the young men at Guy's Hospital might see its reduction; which was always easily accomplished by simply pushing upon it.

Magnum and Cuneiform.—Sir Astley says that both the os magnum and cuneiform are sometimes thrown a little backwards, from simple relaxation of the ligaments, producing a great degree of weakness, so as to render the hand useless unless the wrist be supported; and he mentions the case of a young lady in whom the os magnum was thus displaced, and who was obliged to give up her music in consequence; for when she wished to use her hand, she was compelled to wear two short splints, made fast to the back and forepart of the hand and forearm. Another lady, whose hand was weak from a similar cause, wore, for the purpose of giving it strength, a strong steel chain bracelet, clasped very tightly around the wrist.²

Pisiform.—South says that Gras has described a dislocation of the pisiform bone, in the *Gazette Méd.*, vol. iii., 1835,³ and Fergusson says he has known an example in which this bone was detached from its lower

¹ Richerand, Boyer's Lectures on Diseases of Bones, Amer. ed., 1805, p. 261.

² Sir A. Cooper, op. cit., p. 435.

³ Note to Chelius, by South, op. cit., p. 234.

connections by the action of the flexor carpi ulnaris.¹ Little benefit, he thinks, can be expected from any attempts to keep it in place when it is dislocated, nor is its displacement of much consequence. In case it were dislocated without a rupture of the flexor carpi ulnaris, it would necessarily be drawn more or less upwards, in the direction of the tendon and muscle. In children this bone moves very freely upon the cuneiform, and even in adults it is quite movable, and I have seen a surgeon mistake this natural mobility for a partial dislocation.

Lunare.—Erichsen thinks he has seen a dislocation of the os lunare produced by a fall upon the hand when forcibly flexed. By extension and pressure it was easily replaced, but when the hand was flexed the dislocation was immediately reproduced.²

Notwithstanding that Sir Astley, Miller, and others have taught that the cuneiform bone is liable to displacement, and that South has affirmed the same of the unciform, I have found no account of an example of simple dislocation of single carpal bones except in the cases of the os magnum, pisiformis, and lunare, as above mentioned.

Middle Carpal Articulation.—Maisonneuve has reported an example of simple dislocation, without wound of the integuments, at the middle carpal articulation. A man had fallen forty feet, and was carried dying to l'Hôtel Dieu. The symptoms were almost precisely those of a dislocation of both rows of the carpal bones backwards. The reduction was not accomplished during life, but after death a simple effort of traction was sufficient to replace the bones. The dissection showed that the bones of the second row were almost completely separated from those of the first, upon which they were overlapped backwards. A small fragment of both the scaphoids and cuneiform remained attached to the second row, but, with this exception, the separation was complete.³

Analogous cases have been reported by Desprès⁴ and Richmond.⁵

CHAPTER XIV.

DISLOCATIONS OF THE METACARPAL BONES (CARPO-METACARPAL ARTICULATIONS).

§ 1. Dislocations of the Metacarpal Bone of the Thumb Backwards.

MALGAIGNE has seen two *complete* dislocations of this bone backwards upon the trapezium, and he mentions two other cases seen by Michon and Bourguet, respectively.⁶ Other surgeons have met with similar examples.

¹ Fergusson, op. cit., p. 190.

² Erichsen, Sci. and Art. of Surg., Amer. ed., 1859, p. 259.

³ Maisonneuve, Malgaigne, op. cit., from Mém. de la Soc. de Chirurg., t. ii.

⁴ Desprès, Bull. de la Soc. de Chir. de Paris, 28 avril et 4 mai, 1875.

⁵ Richmond, The Lancet, 1879, vol. i. p. 844. Poincet, op. cit., p. 969.

⁶ Malgaigne, op. cit., vol. ii. p. 728.

Causes.—They have been found to be caused by falls upon the back of the distal extremity of the thumb, forcing the metacarpal bone into a position of extreme flexion; and also by blows received upon the end of the thumb, forcing it into an opposite direction. In some cases they have been caused by blows received directly upon the articulation.

Symptoms.—The symptoms are sufficiently clear, although the position of the thumb is not always the same. It has been found perfectly straight, without any inclination either way, or flexed more or less, with the metacarpal bone also inclined inwards toward the palm. The motions of the joint are interrupted, and the proximal extremity of the metacarpal bone riding upon the back of the trapezium, projects sensibly in this direction, and the trapezium is also felt unusually prominent under the thenar eminence. The overlapping varies from a line or two to three-quarters of an inch. In the patient mentioned by Bourguet, the head of the metacarpal bone almost reached the styloid process of the radius.

Treatment.—The reduction is to be effected by extension alone, or by extension with moderate pressure. In two of the examples reported, although the reduction was accomplished very easily, the dislocation was reproduced when the extension ceased, and it became necessary to apply splints. Malgaigne did not observe, in the case seen by him, any such tendency to displacement.

In the case of Bourguet's patient the reduction was never accomplished, although the attempt was made on the second day by a surgeon, and repeated after about two months by Bourguet himself.

FIG. 309.



Case of Peter Golden.

Fergusson, who has met with several of these dislocations, says that he has seen even a splint and roller fail of keeping these bones in place.

The following is the only example seen by myself: Charles Flannigan, *æt.* 27, caused an incomplete backward dislocation of this bone by striking a man with his clenched fist. It was never treated by a surgeon; and although it always projected a little, and the joint was so loose that he could easily push it into place, it caused him no inconvenience, and after a time the motions became as free as in the other thumb.

About four weeks before he called upon me, and twenty-five years after the first accident, he wrenched it again. He was then employed as a stage-driver, and was fifty-three years old. The dislocation was now complete, and the overriding was about one-quarter of an inch. The thumb was nearly straight, the line of its axis being nearly parallel with that of the bones of the forearm or only slightly flexed.

I reduced it easily by extension, and applied a gutta-percha splint, but I have never seen him since, and do not know the result.

Incomplete backward dislocations of the metacarpal bone of the thumb seem to be produced by the same causes which cause complete dislocations.

The signs of this accident are sometimes obscure, owing to the presence of considerable swelling, and they have been often left unreduced.

In order to the accomplishment of the reduction it will be necessary to employ extension, while at the same moment pressure is made directly upon the displaced extremity: and to maintain it in place a splint and bandage will be required. It is doubtful, however, whether in any case the bone can be made to retain so completely its original position as not to leave a perceptible deformity.

Peter Golden, *æt.* 16, caused a partial dislocation of this bone backwards by a blow upon the back of the distal end. Two medical men whom he consulted on the first and seventh day after the accident failed to recognize the displacement. On the thirteenth day he consulted me. The projection of the metacarpal bone was now quite manifest, the swelling having in a great measure disappeared. Having secured the accompanying photograph (Fig. 309), he was placed under the influence of ether, and the reduction easily accomplished, and with a carefully padded splint of gutta-percha, which included a portion of the arm, it was retained in place. At the end of six or eight months he was again examined by me. The motions of the joint were nearly as free as before, but there remained a slight prominence of the metacarpal bone.

§ 2. Dislocations of the Metacarpal Bone of the Thumb Forwards.

Probably Sir Astley Cooper has reference to an accident of this character when he says—speaking of Dislocation of the Head of the Metacarpal Bone from the Trapezium—“In the cases which I have seen of this accident the metacarpal bone has been thrown inwards, between the trapezium and the root of the metacarpal bone supporting the fore-finger; it forms a protuberance toward the palm of the hand; the thumb is bent backwards, and cannot be brought toward the little finger.”¹

Sir Astley does not, however, refer to any of the cases which he has seen, and Malgaigne says he has not met with such a case, or found one recorded. My own experience and observation correspond with that of Malgaigne; although I must confess I have not made it a special purpose to look for examples in surgical writings.

One can never call in question the accuracy of Sir Astley Cooper's statements, as to what he professes to have seen, however, and I shall, therefore, add what he has said of the mode of reduction. “For the facility of reduction, as the flexor muscles are made stronger than the extensors, it is best to incline the thumb toward the palm of the hand during the time extension is making, and thus the flexors become relaxed and their resistance diminished. The extension must be steadily and for a considerable time supported, as no sudden violence will effect the reduction. If the bone cannot be reduced by simple extension, it is best to leave the case to the degree of recovery which nature will in time produce, rather than divide the muscles, or run any risk of injuring the nerves and bloodvessels.”

Vidal (de Cassis) says he met with an *incomplete* forward dislocation,

¹ Sir Astley Cooper's Treatise on Dislocations, and on Fractures of the Joints, 2d London ed., 1823, p. 526.

which he reduced readily, but the patient removed the dressings and the dislocation was reproduced, and the bone was not again replaced.¹

§ 3. Dislocations of the Metacarpal Bones of the Fingers.

Examples of these accidents are so rare that no attempt will be made to establish systematically the causes, symptoms, or treatment. Such examples as I have found recorded, or as have come under my own observation, will be, however, briefly related.

Dislocations of the Metacarpal Bones of the Fingers Backwards.—Roux has recorded one complete dislocation of the second metacarpal bone upon the os magnum, caused by an explosion in a mine. It was reduced by pressure and extension, but could only be retained in place when the hand was flexed. The patient died on the tenth day, and the diagnosis was verified by the autopsy.

The remaining backward dislocations of the metacarpal bones of the fingers, and all others that I have found recorded, were *incomplete*, and were generally produced by striking with the clenched fist. I will mention a few of several cases which have come under my notice.

In April, 1849, Stephen Peterson, æt. 24, was admitted into the Buffalo Hospital of the Sisters of Charity, with a partial dislocation backwards of the proximal ends of the metacarpal bones of the index and great fingers of the right hand; produced, as he affirms, by striking a man with his clenched fist, about one year previous. He says that he called upon a surgeon immediately, but he was unable to keep the bones in place. The projection was very manifest at the time of my examination, and the hand had never recovered the power of grasping bodies firmly.

During the same year I found in the hospital a precisely similar case, in the person of Francis McCoit, æt. 32, a sailor, which had occurred four years before, in consequence of a blow given with his fist. The same bones were partially displaced backwards, and remained unreduced. This man had also consulted a surgeon soon after the injury was received.

In both of the above examples I instituted a careful examination to determine whether it was not the bones of the carpus which were thus displaced; but the result was conclusive as to the nature of the accident, and I have obtained casts of both, in order to illustrate partial dislocations of the metacarpal bones.

In 1866 I met with a similar case, except that the metacarpal bone of the index finger was alone dislocated, at Bellevue Hospital, in a woman 28 years of age, caused by falling upon her hand with the fingers closed. Reduction was easily effected.

The following example of dislocation of all the metacarpal bones, except that of the thumb, is probably without a parallel. Corporal Garrigan, at the battle of Fredericksburg, Dec. 13, 1862, while holding his gun at "ready" was hit by a ball on the back and ulnar side of his left hand, the ball traversing the back of the hand between the last row of

¹ Vidal (de Cassis), *Traité de Path. Ext.*, 3d Paris ed., vol. ii. p. 564.

carpal bones and the skin, and emerging on the radial side, sending the carpal bones forwards and dislocating the metacarpal bones backwards. Great swelling ensued, and the nature of the accident was not known for some months. When I examined the hand, five years later, the displacement was very conspicuous; no fragments of bone had ever escaped. The motions of all the fingers, except the index and little fingers, were unimpaired.

Dislocations of the Metacarpal Bones of the Fingers Forwards.—According to Malgaigne, Bourguet met with a forward dislocation of the metacarpal bone of the index finger, caused by a great force applied to the back of the hand near the carpus. Reduction was effected by extension and pressure. With the aid of splints it was retained in place, and a cure effected.

The following case of forward dislocation of the second metacarpal bone at its proximal end has been reported to me by J. Marsh, Asst. Surg. U. S. A.:

On the 1st of April, 1868, Corporal Charles C., æt. 25, was struck accidentally on the back of his right hand by a hammer weighing seven pounds. The hand was at the time firmly clenched, and covered with a buckskin glove. The blow was received obliquely. Dr. Marsh saw him half an hour after the accident. A marked depression existed on the back of the hand, corresponding to the proximal end of the bone, and from this point a gradual elevation of the bone could be traced to its natural level at the distal end. On the palm of the hand the displacement was equally manifest. In this position it was fixed, and seemed immovable. It was easily and quickly reduced, however, by making extension from the fingers, while at the same moment pressure was made by the thumb in the palm of the hand. It returned to its place with the usual sensation accompanying a reduction of a dislocation, and the deformity at once disappeared; a ball of tow was now placed in the palm of the hand, and secured there by a roller. On the 13th of April he returned to duty, but his hand did not acquire its full strength for some time longer.

CHAPTER XV.

DISLOCATIONS OF THE FIRST PHALANGES OF THE THUMB AND FINGERS (METACARPO-PHALANGEAL).

§ 1. Dislocations of the First Phalanx of the Thumb Backwards.

THIS bone may be dislocated backwards or forwards, but more frequently the dislocation is backwards. I have met with the backward dislocation ten times.

Causes.—The backward dislocation is occasioned generally by a fall or blow upon the distal end and palmar surface of the thumb.

Symptoms.—I have found the two phalanges in the same axis with

the metacarpal bone at least twice; that is, neither flexed nor tilted backwards; but in most of the cases the first phalanx inclines backwards upon the metacarpal bone, and the second phalanx is flexed upon the first, as seen in the illustration.

FIG. 310.



Dislocation of the first phalanx of the thumb backwards.

Treatment.—The reduction is sometimes, in recent cases, accomplished with great ease, as the following examples will illustrate:

A servant girl, *æ*t. 25, fell down a flight of steps Nov. 15, 1850, striking upon the inside of her right hand and thumb. When I saw her, only a few minutes afterwards, I found the first phalanx standing back almost at a right angle with the metacarpal bone, and the second phalanx also flexed to a right angle with the first. Assisted by my pupil, Mr. Boardman, the reduction was effected in about twenty seconds, by bending the first phalanx farther back, and at the same moment pressing the proximal end of this phalanx forwards in

the direction of the joint. Without employing great force, the reduction took place suddenly and with a snap. Very little swelling followed, and in three weeks she was able to use her needle without inconvenience.

Michael Wolfe, *æ*t. 35, fell from a height, causing a fracture of his left arm, and a dislocation of his right thumb backwards. I saw him within two hours after the accident. The thumb was much swollen, and its position the same as in the case just described. Although Wolfe was a strong, muscular man, the reduction was accomplished in a few seconds by applying over the last phalanx the Indian toy called a "puzzle," and making extension in a straight line, while an assistant made counter-extension from the hand and wrist. The use of the joint was soon completely restored.

Examples, however, are constantly occurring, which are only reduced after long-continued and painful efforts, or which, indeed, completely exhaust the patience and baffle the skill of the most experienced surgeons.

Mary J. S., *æ*t. 23, fell upon her right hand with her fingers and thumb extended, in September, 1853, and dislocated this bone backwards. A young surgeon attempted to reduce the dislocation half an hour after the accident, by the same manœuvre adopted by myself successfully in the case of the servant girl, only that he made extension upon the last phalanx at the same moment. The surgeon believes that the bone was reduced, but one week later he found it displaced, and, as he believes, reduced it again. The same thing occurred a third time.

Six months after this, the girl consulted me to ascertain what could be done for her relief. The thumb occupied the usual position, and admitted of no motion except at the carpo-metacarpal articulation.

In May, 1848, having been called to see G. H., who had attempted suicide by cutting his throat, my attention was arrested by the appearance of his left thumb, and which I found to be occasioned by an ancient dislocation of the first phalanx backwards. The accident had

occurred, he afterwards told me, twelve years before, in consequence of a fall while wrestling. A very respectable country surgeon was called, and made three several attempts to reduce it, but failed.

The several bones of the thumb occupied their usual positions, that is to say, the positions which they usually occupy in this dislocation, yet notwithstanding the almost complete ankylosis of the phalangeal articulations, and the awkward encroachment of the distal end of the metacarpal bone upon the palm, the hand was quite useful.

In September, 1864, I found in my service at the Charity Hospital (Blackwell's Island), New York, an unreduced dislocation of this kind in a girl. The surgeons had tried to reduce it, but had failed.

On the 25th of July, 1857, Catharine Ernst was brought to me, by her parents, having a dislocation of the first phalanx of the right hand, which had already existed some days, and upon which several unsuccessful attempts at reduction had been made. The dislocation was backwards, but the phalanges, instead of standing at an acute or right angle with each other and with the metacarpal bone, as is usually the case, were in a straight line with each other and parallel with the metacarpal bone. Whether this phenomenon existed from the first, or was due to the efforts already made at reduction, I could not determine, but the same thing has been noticed occasionally by other surgeons. The first phalanx, moreover, instead of being placed directly behind the metacarpal bone, occupied a position upon its back a little to the radial side of the centre.

During quite half an hour I made continued and varied attempts to reduce the bone, by extension, by forced dorsal flexion, and by pressing the upper end of the first phalanx in the direction of the joint while pressure was made against its lower end so as to bring it into dorsal flexion, and finally by calling to my aid the "puzzle" and chloroform, but all to no purpose.

One week later I repeated these efforts, and with no better success. The parents peremptorily refused to allow me to cut the lateral ligaments, or flexor tendons, so the bone remains unreduced.

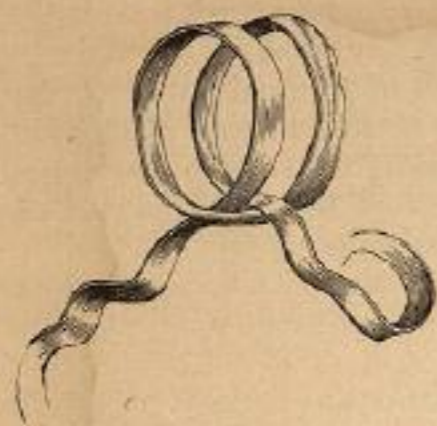
In the following case the relative position of the bones was the same as in the preceding case, but the reduction was not difficult:

Bernard Lawler, *æ*t. 10, was admitted to Bellevue Hospital, in January, 1864, with a fracture of the femur and other severe injuries. The dislocation of the thumb was not noticed until the ninth day. The reduction was then easily accomplished, in presence of the class of medical students, by forced backward flexion.

Surgical writers have recorded, from time to time, a great many cases in which it has been found difficult or impossible to effect reduction; and it is asserted upon the authority of Bromfield, quoted by Hey, that the extending force has been increased to such an amount as to tear off the last phalanx without having succeeded in reducing the first; but while surgeons have united in their testimony as to the exceeding obstinacy of a large proportion of these dislocations, they are far from being agreed as to the source of the difficulty.

Sir Astley Cooper finds a sufficient explanation in the six short and powerful muscles which are inserted into the first and last phalanges.

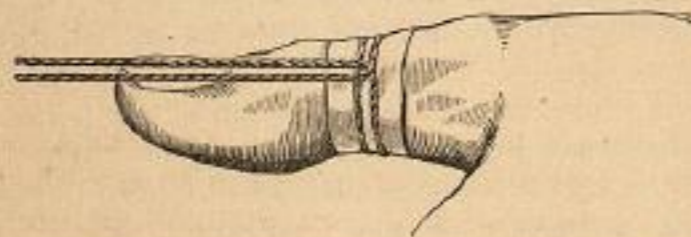
FIG. 311.



Clove-hitch.

between the joint surfaces and interposes an effectual obstacle to reduction. A case of compound dislocation is recorded, in which Esmarch saw the capsule in this position, and button-holed upon the distal end of the metacarpal bone.² Dupuytren ascribes the difficulty to the altered relations of the lateral ligaments, which are naturally parallel to the axis of the metacarpal bone, but which are now placed at a right angle; to the spasm of the muscles, and to the shortness of the member, in consequence of which the force of extension has to be applied very near to the seat of the dislocation. Lisfranc found in an ancient dislocation the tendon of the long flexor so displaced inwards and entangled behind the extremity of the bone as to prevent reduction. Esmarch met with a similar case, in which he opened the joint and replaced the tendon, with a satisfactory result.³ Deville discovered in an autopsy a similar displacement of this tendon outwards. Wadsworth has made the same observation.⁴

FIG. 312.



Sir Astley Cooper's method of reducing dislocations of the thumb, with pulleys.

The modes of reduction practised and recommended by these different surgeons are as diversified and irreconcilable as their views of the mechanism and pathological anatomy of the accident.

Sir Astley Cooper recommends that extension shall be made by bending the thumb toward the palm of the hand, to relax the flexor muscles

¹ Lawrie, of Glasgow, says that Sir Astley, in a conversation with him, declared that the "sesamoid bones" were the sources of the difficulty. See *Am. Journ. Med. Sci.*, vol. xxii, p. 230, with observations and experiments by Lawrie.

² Esmarch, *Berliner Klinische Wochenschr.*, 1876, No. 44.

³ *Ibid.*

⁴ Wadsworth, *Am. Med. Times*, Feb. 13, 1864, p. 77.

as much as possible, and then, by fastening a clove-hitch upon the first phalanx, previously covered with a piece of soft leather, the extension is to be continued, only inclining the thumb a little inwards toward the palm of the hand. If these means fail after having been continued a considerable length of time, he advises that a weight shall be suspended to the thumb, passing over a pulley. Finally, in the event of the failure of this method also, Sir Astley thought that no further attempt should be made, and especially that no operation for the division of these parts is justifiable.

Lizars and Pirrie adopt the views of Sir Astley with little or no qualification.

Charles Bell proposed flexing the joint, employing at the same time pressure; and in obstinate cases he advised subcutaneous section of the lateral ligaments with a small knife, a method which has since been practised successfully by Liston, Reinhardt, Gibson, of Philadelphia, Parker, of New York, myself, and others. Syme and Lizars justify the practice in certain cases. In one case which has come under my notice, after failing to effect reduction by the usual methods, I succeeded promptly after cutting one lateral ligament; and in the second case I only succeeded after cutting both lateral ligaments.

Roser, from his experiments upon the cadaver, concludes that the dislocated phalanx must first be bent forcibly backwards, or into the position termed by some writers dorsal flexion, so as to throw the head of the phalanx forwards upon the articulating surface of the metacarpal bone. Parker, of New York, in his notes to the American edition of Samuel Cooper's work, recommends the same procedure.

Vidal (de Cassis) recommends also that the extension should be made first, backwards, so as to increase the displacement of the first phalanx in this direction, and to throw forwards its articular surface in the direction of the articular surface of the metacarpal bone.

Hueter believes that if this method fails, when combined with some rotation and lateral motion, no other is likely to succeed, and he then advises resection. He has, however, himself in all cases been able to effect reduction, but the difficulty has been to maintain it, owing to the interposition of the capsule; and in such cases he has reduced the dislocation and then applied a plaster bandage, grasping the splint and thumb with his hand until the plaster was hard, and leaving it undisturbed for fourteen days, at the end of which time he has found that the bones would remain in place without the aid of the splint. He believes that the interposed ligament has been in the meanwhile absorbed. To me it seems quite certain that with the capsule thus interposed, permanent ankylosis must be the final result, even though it might be possible to retain the dislocated surfaces in apposition, and that resection would be preferable.

This method, namely, dorsal flexion, as the first and most essential part of the manœuvre, seems to have met with more general approval than any other, and the following observations, made by the late Reuben D. Mussey, of Cincinnati, illustrate the general practice among American surgeons at this day:

"I tilt the dislocated phalanx up until it stands upon its articulating end, place both forefingers so as to hold it in that position, and at the

same time press against the distal extremity of the metacarpal bone, make firm pressure with the thumbs against the base of the dislocated phalanx, and slide it into its place, which can generally be accomplished with ease.

"More than twenty-five years ago, the chairman of this committee, from attention to the mechanism of the metacarpo-phalangeal joint of the thumb, convinced himself that the principal impediment to the reduction of the first phalanx from backward displacement is the short flexor of the thumb, between the two portions of which (lying close together where they are fastened to the sesamoid bones) the head of the metacarpal bone has been thrust, the contracted part or neck of this bone lying firmly grasped by them. Fifteen years ago, a case occurred of this dislocation which he could not reduce in the ordinary way. A subcutaneous division of one of the heads of this muscle was made with an iris knife, and the reduction was accomplished with the greatest ease.

"Last year another case occurred, in which we failed of reduction by Dr. Crosby's method, which we believe to be the best, and the subcutaneous division of both heads of the muscle was made, and the reduction instantly effected. The punctures were covered with collodion, and the thumb supported by a splint. As the patient was intemperate, entire abstinence from liquor and the adoption of a light diet were enjoined. Neither pain nor inflammation followed, and a month afterwards the joint had free motion. After the intemperate and irregular habits were resumed, the joint in a few weeks was found ankylosed. In these cases, the knife, in the subcutaneous operation, was carried down to the metacarpal bone, so far behind its head as to preclude the possibility of mistaking the lateral ligaments for the muscles. The ligaments are very short, and inserted close to the articular surfaces, and are probably, one or both, ruptured in this dislocation."¹

Dr. J. P. Batchelder, of New York, in a paper read before the New York Medical Association in 1856, says: "The surgeon should take the metacarpal portion of the dislocated thumb between the thumb and finger of one hand, and flex or force it as far as may be into the palm of the hand, for the purpose of relaxing the muscles connected with the proximal end of the phalanx, particularly the flexor brevis pollicis. He should then apply the end of the thumb of his hand against the displaced extremity of the dislocated phalanx, for the purpose of forcing it downwards, and at the same time grasp the displaced thumb with his other hand, and move it forcibly backwards and forwards, as in strongly forced flexion and extension, the pressure against the upper extremity of the first phalanx being kept up. In this way the dislocated bone may be made to descend, so as to be almost or quite on a line with the articulating surface of the metacarpal bone, when the thumb may be forcibly flexed, and, if it be not reduced, as forcibly extended, and brought backwards to a right angle with the metacarpal bone; when, if the downward pressure, with the thumb placed as before, directed for that purpose, has been continued (which thumb, by maintaining its position, acts as a fulcrum, as well as by its pressure), the bone will slip into its place, and

¹ Mussey, Trans. Amer. Med. Assoc., vol. iii. p. 357, 1850.

the reduction be effected in less time than has been spent in describing the process."¹

Six successive cases of treatment by this method are mentioned in the *American Journal of Medical Sciences* for April, 1858; one by Rickard, one by Morgan, two by Cutter, and two by Crosby. I have also once succeeded by the same method.

By those who have regarded extension as an important element in the reduction, various instruments have been devised for the purpose of obtaining a secure hold upon the dislocated member. Sir Astley Cooper, as we have already seen, recommended the sailor's clove-hitch;² Lawrie advises that the thumb shall be thrust into the open handle of a large door-key;³ Charrière and Luër, of Paris, have each invented forceps, so constructed with the fenestra and straps, that when the blades are closed the member is held very firmly in its grasp. Richard J. Levis, of Philadelphia, recommends "a thin strip of hard wood, about ten inches in length, and one inch, or rather more, in width. One end of the piece is perforated with six or eight holes. The opposite end is partly cut away, forming a projecting pin, and leaving a shoulder on each side of it. Toward this end of the strip, a sort of handle shape is given to it, so as

FIG. 313.



Levis's instrument for reduction of dislocations of fingers or the thumb.

to insure a secure grasp to the operator. Two pieces of strong tape or other material, about one yard in length, are prepared. One of these is passed through the holes at the ends of the strip, leaving a loop on one side. The other tape is passed through another pair of holes, according as it may be a thumb or a finger to which it is to be applied, or varied to suit the length of the finger, leaving a similar loop. If a dislocated thumb is to be acted on, the second tape should be passed through the holes nearest the first. The ends of each separate tape are then tied together.

"To apply this apparatus, the finger is passed through the loops. The loop nearest the first joint is then tightened by drawing on the tape, which is then brought along the strip to the opposite end, across one of the shoulders, and secured by winding it firmly around the projecting pin. The other tape is tightened in a like manner, crossing the other shoulder, and winding around the pin in an opposite direction, when, for security, the ends of the tapes are finally tied together."⁴

¹ Batchelder, New York Journ. Med., May, 1856, p. 340.

² Op. cit., p. 561; also Boston Med. and Surg. Journ., Oct. 1, 1857.

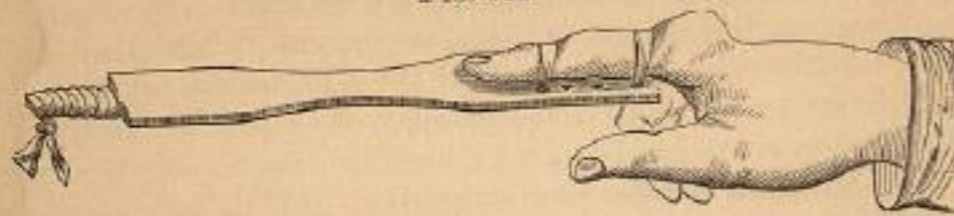
³ Lawrie, Amer. Journ. Med. Sci., vol. xxii. p. 229.

⁴ Levis, Amer. Journ. Med. Sci., Jan. 1857, p. 62.

This apparatus enables the operator to apply both extension and flexion or leverage in any direction. The proximal end of the phalanx may be lifted, or even rotated so as to allow one side of the bone to approach the socket before the other.

Malgaigne describes an apparatus invented by Kirchoff, which is very similar to, yet not quite so complete as this of Levis.

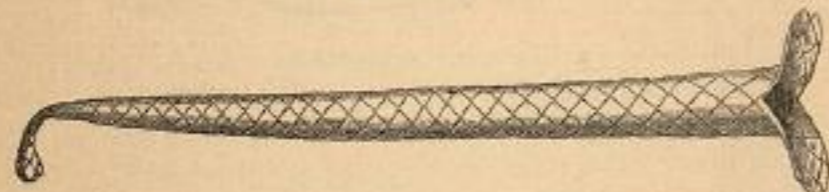
FIG. 314.



Levis's instrument applied to the first finger.

In the April number of the *Buffalo Medical Journal*, for 1847, I have described an instrument, or rather a toy, in my possession, which I suggested might be useful for the purpose of making extension upon dislocated fingers; and which, as will be seen by a reference to one of the cases already reported in this chapter, I have since applied successfully. It is made by the Indians, and may always be obtained during the watering season, at the Indian toy-shops at Niagara Falls. The Indians call it a "puzzle," and know no other use for it than to fasten it upon the thumb or finger of some victim, and then pull him about until he begs to be released.

FIG. 315.



Indian "puzzle," employed for the reduction of dislocations in small joints.

The "puzzle" is an elongated cone of about sixteen or eighteen inches in length, made of ash splittings, and braided; the open end of the cone being about three-fourths of an inch in diameter, and the opposite end terminating in a braided cord. When applied to the finger, it is slipped on lightly, forming a cap to the extremity, and to half the length of the finger, but on traction being made from the opposite end, it fastens itself to the limb with a most uncompromising grasp. If constructed of appropriate size and of suitable materials, it becomes the more securely fastened in proportion as the extension is increased; yet applying itself equally to all the surfaces, it inflicts the least possible pain and injury upon the limb. When we wish to remove it, we have only to cease pulling, and it drops off spontaneously.

Dr. Holmes says that the same instrument is made by the Indians of Maine, and that several years ago Dr. Davis, of Portland, brought one to Boston, and showed it to the Society for Medical Improvement, sug-

gesting that it might be used for the same purpose which I have recommended.¹

Finally, in some compound dislocations it would be better not to attempt the reduction of the dislocation until resection has been practised. Samuel Cooper relates a case in which the reduction was followed by inflammation and death within a week after the accident, and Norris, of Philadelphia, mentions an instance which came under his observation, where violent inflammation and tetanus followed the reduction.² Roux, Evans, Wardrop, Gooch, Sir Astley Cooper, and many other surgeons, have practised resection successfully in these accidents, and have added their testimony in favor of this mode of procedure.

§ 2. Dislocations of the First Phalanx of the Thumb Forwards.

Up to the present moment, I have met with but two examples of this dislocation, while, as has been already stated, the backward dislocation has been seen by me ten times.

Horace Kneeland, of Rochester, N. Y., æt. 24, dislocated the first phalanx of the right thumb forwards, by striking a man with his clenched fist; the force of the blow being received upon the back of the second joint of the thumb. The dislocation had existed three days when he called upon me, and in the meanwhile several attempts had been made to reduce the bone by simple extension. The first phalanx was in front of the metacarpal bone, and in the same plane; but the last phalanx was slightly inclined backwards. The hand was already swollen and quite painful.

Seizing the dislocated thumb in the palm of my right hand, with my fingers resting upon the back of the patient's hand I forced the two phalanges into flexion by firm and steady pressure continued for a few seconds, when suddenly the bones resumed their places, and all deformity disappeared.

Intense inflammation resulted, followed, after a few days, by suppuration under the palmar fascia; and in the end the thumb was almost completely ankylosed.³

On the 24th of April, 1855, J. M. Booth, of Buffalo, æt. 19, called at my office, having a dislocation forwards of the first phalanx, occasioned, about half an hour before, by being thrown from a horse. The last two phalanges were neither flexed nor extended, but straight, and parallel with the metacarpal bone.

By the same manœuvre adopted in the preceding case, but with only very moderate force, the dislocation was promptly reduced.

Causes.—The usual causes of this accident are falls or blows upon the thumb while it is flexed; Lombard has seen it produced by a fall upon the palmar surface of the thumb.

Symptoms.—The symptoms which characterize it are, in general, such as we have seen in the two examples which have just been given. The metacarpal bone projects posteriorly, and the first phalanx produces

¹ Trans. Am. Med. Assoc., vol. i. p. 267.

² Norris, Amer. Journ. Med. Sci., vol. xxxi. p. 16.

³ Trans. N. Y. State Med. Soc., 1865, p. 73.

a corresponding projection toward the palm; the two phalanges are extended upon each other, and parallel with the metacarpal bones. Nélaton saw a case in which the first phalanx was flexed about 45° ; and in several examples it has been observed to be slightly rotated inwards.

Treatment.—In the few examples of this accident which have been reported, the reduction was easily accomplished; or, at least I may say that the difficulties in the way of reduction were not so great as they are usually found to be in dislocations backwards. Malgaigne has been able to collect but four undoubted examples, all of which were reduced; Lenoir was able to effect the reduction by moderate measures, after the bone had been dislocated thirty-eight days. Ward succeeded by simple extension.¹

Lombard, after the trial of other plans, finally succeeded by reversing the phalanx. Employing, as I have before termed it, "dorsal flexion," with extension and lateral motion; but in all, or nearly all the other examples, the reduction has been effected by flexing the thumb forcibly toward the palm; the reverse of the method which we have seen preferred, especially by American surgeons, in dislocations backwards. My own experience also authorizes me to recommend this plan.

§ 3. Dislocations of the First Phalanx of the Fingers.

The index and little fingers, owing to their exposed situation, are most liable to these dislocations. I have met with three examples of traumatic dislocations of these joints, one of which was a forward and two were backward dislocations, and all had occurred in the index finger.

FIG. 316.



Backward dislocation of first phalanx. Reduction by extension.

James Nesbitt, of Buffalo, æt. 11, dislocated the index finger of the right hand, backwards, by a fall down a flight of stairs. On the same day, Feb. 11, 1851, he called upon me, and I found the finger neither flexed nor extended, but straight and immovable. The projections occasioned by the ends of the two bones were very marked, and such as to render an error in the diagnosis impossible. Reduction was accomplished with great ease, by reversing the finger and employing moderate extension, while at the same time the proximal extremity of the first phalanx was pushed toward the distal end of the metacarpal bone. In short, the process was the same as that which I have recommended in dislocations of the thumb backwards.

¹ Ward, New York Med. Times, Sept. 8, 1860.

In the second case, presented in a woman 35 years of age, at Charity Hospital, April 16, 1868, the dislocation was caused by her husband having pulled the finger violently backwards. The metacarpal bone was thrust through the skin on the palm of the hand. Four weeks had now elapsed, and the wound had healed. A few days before, the house surgeon had placed her under the influence of ether and had attempted reduction, but had failed, and she refused to allow me to repeat the attempt.

In the example of dislocation forwards, occasioned by a blow from a hard ball, received upon the end of the finger, the first phalanx was in a position of extreme extension, and the second moderately flexed. Reduction was effected with great ease by extension in a straight line. But if the surgeon were to experience difficulty in the reduction, it would no doubt be advisable to resort to the method of extreme flexion.

In one instance, I have seen nearly all the fingers of the left hand, and the thumb of the right, dislocated backwards by the contraction of the cicatrix after a severe burn.

CHAPTER XVI.

DISLOCATIONS OF THE SECOND AND THIRD PHALANGES OF THE THUMB AND FINGERS (PHALANGEAL).

NOTWITHSTANDING slight differences in the form of the articulations between the thumb and fingers, and in the size and situation of the bones which compose the phalanges of the fingers, I am disposed, contrary to the practice of some other writers upon this subject, to consider all the dislocations to which these several joints are liable, under one section. Nor, indeed, after the attention which I have given to the dislocations at the metacarpo-phalangeal articulations, do I find much to add in relation to these accidents; since in almost every point of view in which they may be considered, they have so much in common.

The last phalanx of the thumb is, of all the phalanges, most liable to dislocation, and this generally takes place backwards. Very frequently, also, it is accompanied with such a laceration as to render it compound. The dislocated phalanx is usually reversed in the backward dislocation, and straight, or nearly so, in the forward dislocation.

In most cases reduction may be accomplished easily by forced dorsal flexion in the case of the backward dislocation, and by forced palmar flexion in the case of the forward dislocation.

In the winter of 1848, a young man was brought into my clinic, who had met with a forward subluxation of this phalanx about one month before. He had fallen upon the end of his thumb, and as the accident was followed by a good deal of inflammation and swelling, he did not notice the displacement until some time afterwards. The proximal end of the last phalanx projected two or three lines toward the palm; the

finger was straight, and this joint ankylosed. I did not think the chance of restoring and maintaining the bone in position sufficient to warrant any interference, and he was dismissed with an assurance that after a few months it would occasion him no great inconvenience.

On the 2d of March, 1851, Thomas Burton, aged about twenty-two years, by a fall dislocated the second phalanx of the middle finger of the right hand, backwards. The force of the concussion was received upon the extremity of the finger. Nine hours after the accident I found the bones unreduced; the finger nearly straight, or with only slight flexion

FIG. 317.



Dislocation of the second phalanx backwards.

of the second phalanx upon the first; the third phalanx forcibly straightened upon the second; all the joints rigid; finger very painful and somewhat swollen.

By moderate extension alone, applied for a few seconds, the reduction was accomplished.

James Cooper, *æt.* 23, came to me on Sunday morning, the 14th of Dec. 1851, to obtain counsel in relation to his finger which had been dislocated the day before, but which he had himself reduced by simple extension made in a straight line. His own account of it was, that he fell upon a slippery sidewalk, striking upon the end of his ring finger

FIG. 318.



Dislocation of the second phalanx forwards.

in such a way that it seemed to double under him. On examination, he found the second bone dislocated inwards, or to the ulnar side, completely, the end of the first phalanx forming a broad projection upon the opposite side; the last two phalanges fell over toward the middle finger, but they were neither flexed nor extended. Seizing upon the end of the finger with his right hand and pulling forcibly, he promptly reduced the dislocation himself.

The bones were now completely in place, but the joints were swollen, tender, and quite stiff.

In Sept. 1851, by the politeness of Dr. Briggs, the attending surgeon, I was permitted to see, in the hospital of the New York State Prison, at

Auburn, a forward dislocation of the second phalanx of the little finger of the left hand, unreduced. The man was at the date of my examination forty-one years old, and the dislocation had existed eighteen years; having been occasioned by a fall. A surgeon in Greene Co., N. Y., had attempted to reduce it soon after the dislocation occurred, but had failed. The joint was nearly ankylosed, yet the finger was quite as useful for all ordinary purposes as before.

Dislocation of the last phalanx is frequently occasioned in the game of base-ball, by the ball being received upon the extremity of the finger.

A young man who was studying medicine, and a private pupil of mine, in attempting to catch a very hard ball, received it upon the extremity of the middle finger of the left hand, dislocating the last phalanx forwards. Twenty minutes after the accident, I found the distal extremity of the second phalanx projecting backwards through the skin, the tendon of the extensor muscle being torn completely off from its point of attachment to the last phalanx. The last phalanx was in a position of slight dorsal flexion, or extreme extension.

Seizing upon the extremity of the finger, I attempted to reduce the dislocation by direct traction, aided by pressure upon the exposed end of the second phalanx, but I was unable to succeed until I brought the last phalanx into a position of palmar flexion.

A slight disposition to redislocation was manifested, and a gutta-percha splint was therefore applied; and, to prevent inflammation, the young man was directed to keep it moistened with cool water lotions. Only a moderate amount of inflammation followed, and in a few weeks the cure was complete.

Such accidents, attended with laceration of the integuments, may occasionally demand amputation, or at least resection of the projecting bone; but I think Mr. Miller is scarcely right when he says that compound dislocations of the fingers almost always are of such severity as to demand amputation. I have myself met with three other cases which were reduced, and did well.

In one case of simple dislocation of the last phalanx of the thumb backwards I have been obliged to resort to section of the lateral ligaments before accomplishing the reduction. This was in the person of a woman admitted to Bellevue Hospital in February, 1864. The accident had happened seven days before, by falling and striking upon the end of the thumb. The position of the last phalanx was extended, that is, in a line with the axis of the first phalanx. She said, however, that it was at first "bent straight back," but that a man took hold of it and pulled it out. Having placed her under the influence of ether, I attempted reduction by forced backward flexion, but failed. I then cut the lateral ligaments by subcutaneous incision, and the reduction was accomplished with great ease.