as to render the likelihood of restoration of its function improbable the removal of the kidney, as in Barker's case, would seem to be strongly indicated. Such cases should offer the best results for nephrectomy, and would hardly be liable to the heavy rate of mortality referred to that operation when the nature of the cases for which it is performed is undistinguished. Each case, however, should be judged upon its own merits before nephrectomy is advised. It is, however, obvious that the logical choice is rather between aspiration and nephrectomy than between nephrectomy and either of the other procedures.

ON THE RARER FORMS OF FRACTURE OF THE CARPAL EXTREMITY OF THE RADIUS.¹

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THE list of fractures of the lower end of the radius runs thus:

1. Colles's fracture (three varieties).
2. Colles's fracture reversed.
3. Epiphysary separation.
4. Rhea Barton's fracture.
5. Rhea Barton's fracture reversed.
6. Fracture of the radial styloid.
7. Longitudinal fracture or fissure of the lower end of the bone.

I propose to submit very briefly some examples which illustrate the pathology of the second and last of these groups. I have already published² my views with regard to Colles's fracture, and I think established the features of its three varieties by the detailed examination of an ample pathological series, which numbers over a hundred examples. I shall refer to these varieties only so far as is unavoidable in the discussion of the reversed Colles's and the longitudinal fractures contained in No. 7. Epiphysary separations have had their features so fully and clearly delineated by Professor R. W. Smith that I need not speak of them.

4 and 5—Rhea Barton's fracture and its reverse—are now admitted to be only Colles's fracture, and the groups are of interest only as they serve to record the fact that this observer as long ago as 1838 recognised the clinical features of the lesion which modern American writers attribute to Smith as its describer, that is, reversed Colles's.

The view Rhea Barton held of these injuries was that in the first and most common injury extreme extension of the wrist pressed the carpal bones so heavily against the dorsal margin of the carpal articular surface of the radius that this margin broke off.

In the rarer injury overflexion of the wrist pressed, according to the author, the carpus so hardly against the anterior border of the radial carpal surface as to carry it away.

One of the latest American writers³ on the subject disposes of this fracture thus: "In the forty-five years which have elapsed since the publication of these views there has not been, so far as I have been able to ascertain, a single instance placed on record in which they have been confirmed by dissection." I can fully endorse this statement, and should not have placed the groups in my list but for the fact that the textbooks of our American fellow-workers in general include them, and for the fact that, though in error in his pathological detail, it is clear that Barton was amongst the first observers of his time; that he recognised Colles's fracture and its reverse as distinguished from dislocation of the wrist. I may therefore pass this section of the subject by stating only that I can produce many specimens which might, at the first glance, be put down as Barton's fracture, but they are all reducible to fractures of the carpal surface secondary to the occurrence of impaction in Colles's fracture.

I now submit a few facts as to the reversed Colles's fracture, which would probably have remained for some time unpublished but that the chance of daily surgical practice has enabled me to record a case observed in the living, a tangible record of which I have preserved in this cast.

Here is Smith's cast of the injury, which is his only fact,

and it is clear to anyone who reads the description that the history of the case was not in his possession, for he gives us no details regarding it. He says: "I cannot speak with accuracy as to the anatomical characters of the injury, having never had the opportunity of examining after death the skeleton of the forearm in those who had during life met with this accident, nor is there any preparation showing the exact relative position of the fragments in any of the pathological collections in Dublin."

Hamilton, in his sixth edition, 1880, refers to the rarity of this fracture, and quotes part of the passage I have just read in support of this view. Mr. Callender's two specimens of this injury and a single clinical observation seem to be the total of London cases.

Professor Gordon⁵ published a woodcut representing the radius broken in this manner, and states that there exists a second pathological specimen of the fracture in the Museum of the Queen's College, Belfast; but he says: "I have not met with the accident in the living." Yet on this slender stock of facts he names the injury the "articular fracture of the lower end of the radius"—a name most inappropriate, as it would lead a novice to suppose that this alone of fractures of the lower end of the radius involved the radio-carpal joint.

Of the eight specimens of this fracture before the Academy, three present their carpal surfaces unbroken, and five have these surfaces more or less fissured by fractures. I think that these comminutions have resulted from the same cause as that which produces the comminutions of the lower fragment in ordinary Colles's fracture, namely, the intrusion of the lower end of the upper fragment into the lower, which causes a greater or lesser degree of splintering of the lower. The fact that three of these specimens and the example figured by Voilemier⁶ are fractures which do not involve the wrist-joint disposes of Professor Gordon's name for the injury—"the articular fracture." In all these examples the radius is broken transversely as in Colles's fracture; but the lower fragment, in one piece or comminuted, is displaced forwards.

The injury recorded by this cast was the following:—A jockey, aged 19, was backing for the first time a three year old filly, she bucked and burst the girths, and sent saddle and rider into the air. The rider fell to the ground, striking first on the back of his right hand. I saw him the day following. The injury had been readily recognised by the deformity, the facility of reduction and the distinct osseous crepitus felt on the reduction; immediately on the relaxation of the reducing force the deformity recurred. I took the patient into hospital and verified the details, and treated the patient until union was obtained.

It would seem then that Rhea Barton and Mr. Callender were hitherto the only observers of the clinical details of the injury, and that the pathological facts bearing on it were not much more plentiful here or in America. I need not then apologise when I submit a cast of the recent injury taken previous to reduction, and a series of eight pathological specimens obtained, one from the museum of this college, to which it was presented by Mr. Swan, in 1885, and the seven which I have myself procured from the anatomical department of the School of Physic in Ireland. I think we may then fairly reject the conclusion arrived at by M. Lecomte, who states his opinions in a series of dogmatic assertions, of which this is the first: "All the fractures of the inferior extremity of the radius are produced by a single and the same class of fall; falls on the palm of the hand."

It is I think clear that the reversed Colles's is the result of a fall on the back of the hand. I shall now briefly examine the longitudinal fractures of the lower end of the radius, and I hope show that they result from causes other than falls on the palm of the hand. The leading case which bears on this question is that recorded by Bigelow. The Catalogue of the Warren Museum contains this description of the specimen, 1035. "The lower extremity of the radius showing a stellate crack of the articular surface and extending upwards for more than an inch. From a patient, who died of other injuries. At first there was only a complaint of lameness as from a sprain, but after some days there were swelling and tender-

¹ Read at the Royal College of Surgeons in Ireland before the Pathological Section of the Royal Academy of Medicine in Ireland.

² BRITISH MEDICAL JOURNAL, May 2nd, 1880.

³ Packard Ashurst's *Encyclopædia*, vol. iv, p. 168.

⁴ *On Fractures in the Vicinity of Joints*, R. W. Smith, 1847, p. 163.

⁵ *Fractures of the Lower End of the Radius*, 1875, p. 30.

⁶ *Clinique Chirurgicale*, Pl. 1, Fig. 1.

ness which, from their persistence, led Dr. B. to diagnosticate a stellate crack of the bone as a probable result of the fall, and of which he had met with a similar case two years previously. Dr. B. remarked that the bones of the wrist would act as a wedge upon the concave articular surface of the radius; and that this case would explain the persistence of some cases of sprained wrist." Case published in the *Medical Journal*, (vol. lviii, p. 99) with a figure, and copied with the figure in Dr. F. H. Hamilton's works on *Fractures*, 1848.

Fig. 1.

The details of the injury given here are very meagre, and leave us in doubt as to whether the patient fell on the palm of the hand or not. From the description and figure it appears that there was not any transverse fracture of the lower end as in Colles's fracture, and that the fissures were not, therefore, such as occur in the articular surface in at least one-half of the cases of Colles's fracture.

I now submit a series of radii which belong, two to the museum of this college, and five to the museum of the School of Physic, which present fissures that occurred during the lives of their owners; with these I submit two broken experimentally. The earlier specimens that I obtained showed fissures of the articular surface only, and occupied my attention because of the difficulty in explaining their origin. This

Fig. 2.

Fig. 3.

specimen (Fig. 2), placed in the museum of this college by the late Dr. Richardson, was the first which I saw that helped me to a solution of the question; it was damaged by being caught in machinery, probably a cog-wheel—such is the note on the label.

I at once tried if I could produce such fractures on the dead bone. If one wraps a towel round the end of the dry bone, and presses with the heel on the carpal end of the radius as it

lies on the ground, the bone yields and crepitus is felt; with the lighter degrees of pressure it is possible to break the bone only in the concave surface of the articulation, and to produce lines identical with those of these macerated specimens, strictly limited to the articular surface. (Figs. 3, 4, 5, 6.) A

Fig. 4.

Fig. 5.

greater degree of force extends the fissures upwards in the compact wall of the bone. If a man be trampled in a crowd, or if a weight of any kind falls on the wrist, such a damage can readily happen, still more if a wrist, as we often see, be rolled in machinery. It seems more rational to look for the cause of these fissures in such injuries than to attribute them to the wedge action of the carpal bones.

The experiment I have described is best made on bones in which maceration has removed the articular cartilage; in these the fissures of least degree will be seen in the articular layer of bone, but would be concealed in the bone covered by cartilage. This is illustrated by one of my specimens, where the cracks are evident in the shaft on both palmar and dorsal sides of the bone, and are traceable into the cartilage at each margin of the joint, but have not torn it.

Of the fracture of the radial styloid I can only say that this specimen (Fig. 7) is a perfect example, remarkable for the

Fig. 6.

Fig. 7.

downward displacement of the fragment, which has caused elongation of the outer border of the bone, probably as we see the inner malleolus displaced by traction of the internal lateral ligament of the ankle joint. I have never recognised the injury in the living, and this united fracture is the only example I have seen.

GRATUITIES TO POOR-LAW MEDICAL OFFICERS.—DRS. W. J. Lush and J. P. Williams-Freeman, medical officers of the Andover Union, have each been voted a sum of £20 by the guardians, in addition to their salary, as extra remuneration for the increase in their work resulting from the late epidemic of influenza.