	Cases.	Deaths.	Mortality per cent.
Inguinal	55	15	27.27
Femoral	37	8	21.62
Umbilical	17	3	17.64
Ventral	1	1	100.00
Total	110	27	24.54

In this table there can, however, be little doubt that from accidental causes the danger of the inguinal form is exaggerated, while that of the umbilical is diminished. In order to compare these results with those met with elsewhere, I have collected the statistics of St. Bartholomew's and St. Thomas's Hospitals for the same years (1889 to 1900), and of the Middlesex Hospital from 1891 to 1900, and have found a most remarkable discrepancy between the three institutions, the gross mortality being at St. Bartholomew's 32.3 per cent., at St. Thomas's 19.9 per cent., and at the Middlesex 22.6 per cent. Such differences can only be due to local conditions preceding the admission of the patient, and as I am entirely ignorant of these conditions, I have endeavoured to eliminate them by adding all the figures together. We thus obtain the following table of the mortality in these three representative hospitals:

	Cases.	Deaths.	Mortality per cent.
Inguinal	496	99	19.95
Femoral	485	120	24.74
Umbilical	109	49	44.95
Total	1,090	268	24.58

The approximation of the total mortality to that met with in my own cases is so absolutely close that it may perhaps be regarded as correctly illustrative of English hospital practice.

A further point of interest appeared, in analysing my own cases, in the fact that the mortality had tended gradually to diminish, the first 55 cases showing 16 deaths (29 per cent.), while the second 55 yielded only 11 (20 per cent.). A progressive increase of recoveries was also found on dividing the 110 cases into three periods. The far larger figures obtained from the three London hospitals emphasize this improvement in results. In the years 1889 to 1894 (both inclusive) we find 427 cases with 130 deaths, or 30.44 per cent., while in the following six years we have 663 cases with 138 deaths, or 20.81 per cent., a reduction of one-third of the total mortality, and again a remarkable similarity to my own statistics.

This improvement in results can certainly not be attributed solely to improvements in the methods of operating, and is probably to be ascribed to the increasing intelligence of the patients, who more readily accept operation, as well as to an increase of confidence upon the part of the profession in general, with a more emphatic insistence upon the necessity for early interference. Possibly the hospital surgeon himself now operates more readily upon cases which would formerly have been treated by taxis, and would in some instances have been "cured" thereby.

A consideration of the causes of death in our fatal cases is also of interest. In 9 of the 27 cases the intestine was gangrenous or perforated by ulceration at the time of operation, and in 2 at least of these there was general peritonitis; of 10 cases with perforation or gangrene only 1 recovered, the remainder surviving for a few hours only. There remain 18 cases in which the intestine was reduced. Of these 14 died within 24 hours from shock or intoxication. One of these is especially interesting, as an umbilical hernia had been partially reduced, with marked improvement, two days before I saw her. Persistence of symptoms then led to operation in *articulo mortis*, which disclosed strangulation within the sac by a Meckel's diverticulum. Of the 4 still remaining cases one man, aged 84, died on the eighth day from pneumonia; a woman with very advanced mitral stenosis died on the fifth day from exhaustion, and 2 died from sepsis. One of the septic cases was an umbilical hernia with extensive ulceration,

in which disinfection of the operation area was probably imperfect; the wound healed, but death occurred from exhaustion on the eighth day, and a localized intraperitoneal abscess was found beneath the wound. The other was a case of inguinal hernia which ran a normal course for 16 days, when suppuration began around the sac, and was followed by sloughing and exhaustion.

We may perhaps fairly summarize these conditions as follows: Of 27 deaths 9 were due to delay, leading to gangrene, and 14 to delay, which rendered the patient unable to bear the slight shock or to recover from the auto-intoxication of intestinal obstruction; 2 resulted from causes to which the operation was only subsidiary (advanced age and mitral stenosis); and 2 were direct results of the operation *per se*. The septic cases occurred in 1891 and 1894 respectively, since which years there have been great improvements in the equipment and technique of the operating theatres at the Manchester Royal Infirmary.

A further point which appears from these statistics is the importance of age in estimating the mortality of herniotomy: Of 27 fatal cases the average age was 50.2 years, while of 83 which recovered the average was only 41.7. Of the 10 infants and young children none died.

The methods of operation which were adopted varied from time to time. In almost all chemical antiseptics were somewhat freely used, a practice which I have now abandoned. Drainage by rubber tubes was adopted only in a few of the earliest cases; at a later stage gauze drains were employed only very exceptionally, the majority of the wounds being at once closed. The sac having been opened, its contents were always carefully washed with some antiseptic solution; herniated omentum was invariably removed, and the intestine was reduced in all "doubtful" cases. The gangrenous cases fall into two classes. In 8 the patient's condition was very bad, and the intestine was merely opened and left with or without a suture to attach it to the skin, the stricture being divided; of these 7 died. In 1 case several inches of small intestine were resected with end to end union by Maunsell's method; in another the caecum and a small portion of the ileum and colon were excised, union being again effected by Maunsell's method; both of these cases died within a few hours.

After reduction of its contents the sac was usually ligatured or sutured with silk and some method of "radical cure," which varied with the region and has varied also from time to time, was adopted in all but a few of the earlier cases, or in those which were at the time of operation obviously in *extremis*.

Two cases of inguinal hernia, which had been reduced *en masse* and which are fully recorded elsewhere, were treated by median laparotomy, both recovering.*

REFERENCES.

- * Lectures on Hernia, London, 1889, p. 88. ² Am. Jour. of Obstetrics, 1890, p. 8. ³ Loc. infra cit. ⁴ St. Bartholomew's Reports. ⁵ Centralbl. f. Chir., 1894. ⁶ Med. Chronicle, vol. xiv, September, 1891.

TWO CASES OF INTERSTITIAL NEPHRITIS IN CONGENITAL SYPHILIS.

WITH REMARKS ON SYPHILIS AS AN ETIOLOGICAL FACTOR IN NEPHRITIS.

BY

G. A. SUTHERLAND, and J. W. THOMSON WALKER,

M.D., M.B., F.R.C.S.,
Physician to Paddington Green Children's Hospital. Pathologist to the Paddington Green Children's Hospital;
Surgical Assistant to St. Peter's Hospital and Assistant Surgeon to the North-West London Hospital.

THE following two cases are examples of a form of nephritis which has hitherto received but little attention:

CASE I.

History.—A. C., female, aged 16 months, was admitted to Paddington Green Children's Hospital on September 20th, 1901. The parents were Italians and the father, who was said to have had syphilis, had died of heart disease. There had been one other child who was stillborn. The patient had appeared to be healthy up to the age of 6 months, when the right eye was noticed to be inflamed; the left soon became similarly affected and she began to lose flesh. During the two months before ad-

mission, she had wasted rapidly and had taken in the way of nourishment only a little beef tea.

State on Admission.—She was distinctly emaciated, weighing 12 lb., and presented evidence of congenital syphilis in the wizened face, the muddy complexion, and the sores around the anus and on other parts of the skin. She lay in a semi-comatose condition, taking no notice of anything, without voluntary movement, crying slightly only when disturbed, and never smiling. Owing to severe double ulcerative keratitis, with perforation of the cornea in the left eye, she was unable to see, and it was impossible to examine the discs. There were slight, but definite, evidences of rickets in the long bones. The right forearm was bent about the middle, the result evidently of an old greenstick fracture. The right arm lay motionless, apparently paralysed, and did not respond to any change of position. In marked contrast to this, were curious movements of superpronation in the left arm, suggesting athetosis. Sensation was dulled generally and the plantar reflexes were active. The spleen was enlarged and extended about an inch below the ribs. The cardiac action was weak but there was no evidence of organic disease. The lungs and liver and temperature were normal. Mercurial treatment was adopted.

Progress.—During the seventeen days that she lived in the hospital, there were few changes to be noted. At times she passed a considerable amount of blood and mucus per anum without other evidence of intestinal disturbance. The right arm became rigid, and the same condition extended to the lower extremities, the toes and feet becoming fixed and pointed. There was also definite retraction of the head. On one occasion there was retention of urine, and urine drawn off by the catheter was pale in colour, and contained a small amount of albumen. On another occasion, she had an attack of hyperpyrexia, the temperature, rising to 106.4° F., with signs of extreme collapse. There was no improvement under the mercurial treatment, and she sank gradually with increasing coma and rigidity, the latter condition being very marked before death.

Necropsy.—*Syphilitic arteritis of left, middle, and anterior cerebral arteries; softening of left frontal lobe; acute interstitial nephritis.* The body was emaciated. On removing the dura mater, a quantity of clear, straw-coloured fluid was present in the subarachnoid space, being most abundant over the left frontal lobe. The left frontal lobe was small and shrunken, the convolutions in front of the fissure of Rolando being crowded together and greatly diminished in size, and the substance of the lobe soft and diffuent. The lateral ventricles contained a slight excess of clear fluid. The cut end of the left internal carotid artery projected rigidly from the up-turned base of the brain, its lumen being open and the wall thick and white. There was also thickening and rigidity of the wall of the left middle and anterior cerebral arteries, and a small segment of the basilar artery showed a similar change. On microscopic examination of the left middle cerebral artery, the following changes were observed (Fig. 1): In the adventitia a wedge-shaped area,

Fig. 1.—Section of left middle cerebral artery $\times 60$. The dark irregular line is the elastic lamina. Note the wedge-shaped area of infiltration of the outer and middle coats and the changes in the elastic layer and intima at the right upper segment. A fine line of newly formed elastic tissue is seen penetrating the thickened intima at the extreme left of the section.

base outwards, comprising about one-eighth of the circumference, was infiltrated with small round cells, and the vasa vasorum were here dilated and increased in number. This change was present in the corresponding part of the tunica media and completely obscured the muscle fibres. The fibres of the elastic lamina, corresponding to this infiltrated area in the outer and middle coats, were separated from each other by small round cells, the elastic layer being broader but less compact. At

another part of the artery a well-marked strand of elastic tissue, apparently of new formation, penetrated into the thickened tunica intima. The changes in the intima were more marked than those in the other coats, and were not confined to a segment of the circumference. The endothelium showed abundant proliferation, but the greater part of the intima had the appearance of granulation tissue, the capillaries being derived from the infiltrated area of the outer coat. The right kidney was much enlarged and deeply fissured. The capsule stripped easily, and exposed a surface stippled with yellow dots and a few pea-sized yellow areas. On section (see Fig. 2) only the upper pole of the kidney, about one-fifth

Fig. 2.—Naked-eye appearance of right kidney, Case 1, on section. The diseased portion (four-fifths) is pale in colour, and sharply defined from the dark normal (one-fifth) kidney substance.

of the cut surface, was normal in appearance. The rest of the cortex had a brilliant pinkish-yellow colour, with here and there small wedge-shaped or irregular areas of apparently normal kidney tissue. The limit of the change in the cortex was sharply defined from the normal kidney tissue. The pyramids were of a dark reddish-brown colour, contrasting strongly with the bright yellow cortex. The renal pelvis and arteries were normal. On microscopic examination (Fig. 3) the interstitial tissue of the cortex was densely infiltrated with round cells (Fig. 3.) Here and there the infiltration was so dense that the tubules and glomeruli were obscured, while in other areas, for the most part subcapsular, it was absent. Under the high power the cells in these infiltrated areas were found to be small mononuclear round cells and larger multinuclear cells, but there were also many large cells with a single nucleus. One would therefore infer that the process was in part an invasion of cells from the blood stream and in part a proliferation of the intertubular tissue. Fine capillary vessels were found in the infiltrated areas, and here and there their contents had escaped into the surrounding tissues. The adventitia of the larger vessels was infiltrated by closely-packed small round cells, but the media and intima were unchanged. The kidney tubules were widely separated by the infiltrated interstitial tissue. The lining epithelium was somewhat granular in appearance, and in many tubules the lumen was filled with casts of homogeneous material or masses of round cells. In the patches of dense infiltration the epithelium was shed, and blocked the lumen of the tubule. A few of the glomeruli showed a slight increase in their nuclei, but the majority of them showed no change. In the medulla round-cell infiltration was present, but only to a slight degree. In this part of the kidney there was engorgement of the blood vessels, and the straight tubules contained casts of round cells. The left kidney was slightly increased in size. The changes in its substance were similar in character to those in the right kidney, but much less marked in degree.

CASE II.

History.—The patient was a female infant, 3 months old. When first seen she had a small lump (? gumma) over the right frontal region, which had

been present for six weeks. She was ordered $\frac{1}{2}$ gr. doses of grey powder twice daily. A week later she was found to be suffering from an acute septic sore throat, with general purpura and hyperpyrexia. She died within twenty-four hours of admission. There was nothing in her family or personal history pointing to syphilis, but her appearance at the first examination was considered diagnostic of that affection.

Fig. 3.—Section of renal cortex. Case 1. $\times 450$. The dense infiltration and the separation of tubules is well seen. One normal glomerulus is shown.

Necropsy.—The ossification of the cranial bones was remarkably incomplete, the various bones of the cranium being widely separated. A space the breadth of two fingers separated the squamous portion of the temporal bone from the left parietal, the gap being bridged by membrane. There was a large collection of clear straw-coloured fluid in the cisterna basalis and pontis, and the lateral ventricles were distended with similar fluid. A circumscribed patch of yellow lymph about the size of half-a-crown was present on the under surface of the right temporal lobe. The arteries of the circle of Willis and brain showed no abnormal changes to the naked eye. There was sloughing pharyngitis and tonsillitis. The left kidney was slightly enlarged, and the capsule stripped easily, exposing a healthy surface. On section the cortex was seen to be of normal breadth. The cut surface as a whole was pale in colour, with here and there pale yellowish patches in the cortex. These patches were most marked at an area midway between the upper and lower poles, and the convex border of the kidney was more prominent over this part. The patches gave the impression of an infiltration of the cortex, and were unlike the colour seen in fatty changes. At the bases of the pyramids there were well-marked dark haemorrhagic spots. The pyramids were normal. The right kidney was not enlarged and the capsule stripped readily. The cut surface was pale throughout, but showed none of the patches of infiltration seen in the left kidney. There were, however, several spots of ecchymosis similar in position to those in the left kidney. The remaining organs were normal. The microscopic examination of the kidneys demonstrated changes similar to those found in the previous case. There was the same diffuse infiltration of the cortex with round cells. The glomeruli and tubules were normal, but widely separated by the infiltration. The epithelium of the tubules was unchanged. The vessels of the cortex were engorged with blood. The infiltration was present also in the interstitial tissue of the pyramids but was much less marked, and towards the apex of the pyramid was entirely absent. There were none of the changes found in chronic nephritis.

In the first case there were, in addition to the interstitial nephritis, pathological changes in the cerebral arteries which are worthy of attention. It is convenient to consider these arterial changes first before turning to the nephritis common to both cases.

The condition is one of arteritis obliterans of the cerebral arteries alone, occurring in a syphilitic child, and is therefore an example of Heubner's syphilitic endarteritis. Microscopically, there is nothing to distinguish this condition from a similar obliterative process which takes place in chronic inflamed areas, in arteries after ligature and in the neighbourhood of tumours, and the diagnosis, therefore, rests upon the localization of the arteritis to the cerebral arteries, the history of syphilis and the absence of any of the other causes just mentioned.

The process was considered by Heubner¹ to be primarily a

proliferation of the tunica intima, and he believed that changes found in the muscular tunica and the adventitia were secondary, and were by no means an integral part of the process. Friedlaender² and Baumgarten,³ on the other hand, refer to the adventitia as the starting point of the process. We are inclined to agree with the latter authorities in laying greater stress on the changes in the vasa vasorum of the adventitia than the proliferation of the endothelium.

It is certainly possible to cut sections in which no change is apparent in the middle and outer coats, but it will be found that in other sections in the immediate neighbourhood there is well-marked infiltration around and increase in number of the vasa vasorum.

The process appears to consist in the production of granulation tissue in the vessel wall, which begins in the outer coat but only reaches its greatest development in the intima. The vessels of this granulation tissue are derived from the vasa vasorum, a very easily observed fact, and it is not unreasonable to suppose that the inflammatory phenomena commence in the vasa vasorum themselves. Changes in the elastic lamina are very constant, and it has been said that the development of a secondary layer of elastic tissue, such as our sections show, is characteristic of the syphilitic form of obliterative arteritis. We are not, however, convinced that this phenomenon has much diagnostic value.

Syphilitic arteritis is an uncommon complication of congenital syphilis. Heubner's original cases were all adults, and so were the cases on which the observations of nearly all the subsequent writers were based. Only a few isolated cases of arteritis syphilitica in congenital syphilis are found in the literature, such as those of Barlow⁴ and Chiari.⁵

The occurrence of this process in the early months of congenital syphilis raises a point of some interest. Syphilitic arteritis is usually looked upon as a tertiary manifestation, and there is no doubt that the condition, with or without the presence of gummata in the immediate neighbourhood of the affected arteries, may coincide with tertiary lesions and chronologically come into this period. There is, however, undoubted proof that the condition may occur during the secondary period, accompanied by symptoms of secondary syphilis, and we have seen sufficient evidence, *post mortem* and clinical, to feel convinced that it has perhaps more claim to be considered a secondary than a tertiary syphilitic process. Such cases as the one under consideration certainly give support to this view.

When we turn to the renal changes we are on ground common to the two cases. In both cases the process consists of a diffuse infiltration of the interstitial tissue of the cortex, and in both there is evidence of congenital syphilis. Dr. Stoerk, of Vienna,⁶ has recently described the effect of syphilis upon the kidney during fetal life. An arrest of development takes place, or at least the growth is retarded, so that at birth the outer layer of cortex contains imperfectly-developed tubules and glomeruli. Such, then, is the condition which may truly be called the congenital syphilitic kidney.

In the two cases we present the kidneys are fully developed, and the condition in no way corresponds to that described by Stoerk. They are cases of interstitial nephritis occurring in the subjects of congenital syphilis, and what we have to consider is how far the syphilitic poison is responsible for the production of the condition.

It is recognized that the etiology of nephritis in childhood is in many cases extremely uncertain. Dr. Leonard Guthrie,⁷ in 1897, when discussing eight cases of chronic interstitial nephritis in childhood, insisted upon this uncertainty.

More recently Dr. Guthrie⁸ reported a case of chronic interstitial nephritis, due to congenital syphilis, and he says: "On the whole, although the evidence is far from being conclusive, I am inclined to think that chronic interstitial nephritis in young children is due to hereditary syphilis."

Massalongo⁹ has also fully described a case of chronic interstitial nephritis in a syphilitic child. On the other hand, cases of acute interstitial nephritis in congenital syphilis have been described by Coupland¹⁰ and Ströbe.¹¹ If we look at the records of cases of congenital syphilis we get some idea of the frequency with which renal disease is found in this connection. Thus we find that Speiss¹² has collected 34 cases, 10 of which had renal disease.

The association of renal disease and congenital syphilis is therefore not very uncommon, and a certain number of cases are on record in which interstitial nephritis, either acute or chronic, has occurred in these subjects without any very evident exciting cause.

The importance of syphilis as the causative factor in these cases cannot we think be disregarded. We would go further, and state our belief that the sole cause in many cases of interstitial nephritis in children is the syphilitic poison.

Nor does the importance of this question of etiology cease with these cases occurring in childhood.

The early changes in the granular kidney of adults are still speculative and the cause obscure. We are in accord with Dr. Guthrie when he suggests that hereditary and acquired syphilis may account for many of these cases also. It is possible, and we believe probable, that many cases such as those we have described have been passed over in the *post-mortem* room. For although in one of the kidneys of the first case the changes were very striking to the naked eye, yet in the other kidney they were but slight, while in the second case only at one part of the left kidney was there any change likely to arrest the attention, and this did not by any means lead one to expect the extensive infiltration revealed by the microscope. Moreover we read that in two of the cases described (those of Coupland and Ströbe) the kidneys showed no changes to the naked eye.

We would therefore submit that syphilis plays a more important and frequent rôle in the etiology of nephritis in childhood, and perhaps also of adult life, than has hitherto been recognized.

REFERENCES.

- ¹ Die luetische Erkrankung der Hirnarterien, Leipzig. ² Centralbl. f. d. med. Wissensch., 1876, No. 4. ³ Virchow's Archiv, lxxiii, s. 90, 1878. ⁴ Trans. Path. Soc. Lond., 1877, xxviii, p. 287. ⁵ Wien. med. Woch., 1881. ⁶ Wien. Klin. Woch., 1901, No. 47. ⁷ Lancet, February 27th and March 13th, 1897. ⁸ Reports of the Society for Study of Disease in Children, vol. i, 1901, p. 69. Internat. Congr. Rome, 1894; Med. Rec., April 28th, 1894. ⁹ Trans. Path. Soc. Lond., 1876, xxvii, 304. ¹⁰ Centralbl. f. allg. Path., 11, 1891, 1009. ¹¹ V. die verschiedenen Nierenaffektionen bei Syphilis constitutionalis, Inaug. Diss., Berlin, 1877, quoted by Ströbe.

KNOCK-OUT BLOWS.

By JAMES GRAY DUNCANSON, M.B., C.M.,
Shooter's Hill.

I THINK medical men are somewhat tardy in considering those accidents which are directly related to sport; by so doing they are causing themselves to be ignored by many in the athletic world to the benefit of the quack and the bonesetter. Of late twopenny monthly papers of mushroom growth have sprung up, professedly devoted to physical culture; they often contain wholesale condemnation of the medical profession and all its science and art; by their efforts they are leading many of the ignorant and unwary into the hands of the charlatan.

During the last few years boxing has in this country received a marked stimulus, and is recognized by civil, military, and other authorities as a sport requiring courage, strength, and self-control, with resource and endurance, therefore deserving all encouragement.

A general impression prevails that there is only one blow—that on the point of the jaw (dealt with in a paper by me published in the BRITISH MEDICAL JOURNAL of April 4th)—which constitutes the knock-out blow. This is an error. There are a number of places more or less easily defined in area, on the head and body, which are specially vulnerable, and although the danger is minimized to a great extent owing to the increased area covered by a boxing-glove, which may weigh from 2 oz. to 6 oz. or more, as compared with the naked fist, still a dangerous and even fatal blow may be delivered with the gloved hand. I will briefly enumerate the different dangerous points, and shortly describe the effects of a heavy blow on each.

The temple appears to be a particularly vulnerable part of the head, and in the days of bare knuckles a blow upon it was frequently attended by serious results. Fracture has occurred, but the lesion now produced is usually laceration of the brain substance, with hæmorrhage, as was shown in a necropsy some time ago, on a boxer killed in the ring. The blow on the angle of the jaw is usually directed upwards and a little backwards; this forces the condyle of the lower jaw into the glenoid fossa of the temporal bone, causing severe concussion and even fracture of the base of the skull.

A swinging short-arm blow delivered on the ear may cause rupture of the membrana tympani, dizziness, and collapse, followed by sickness; on examination, air is found to pass through the rent with a hissing sound which may be heard at a distance from the man; recovery is slow, but may be

perfect. One case I observed was in a bandsman of the 10th Hussars; he had received a blow such as I describe, paid no attention to it till next day; when he came to blow a cornet he was amazed by the hissing in his ear. The blow on the point of the jaw is the one most frequently attempted; the symptoms produced and their explanation I had the opportunity of bringing before the profession in a previous number of the BRITISH MEDICAL JOURNAL. A dangerous blow may be delivered on the neck if, when the head is thrown back, the side of the neck being exposed, the gloved hand be driven forcibly on a spot midway between the angle of the jaw and the sterno-clavicular articulation (the carotid hit); another point is just on the larynx or hyoid bone. The danger in these blows lies in the concussion conveyed through the large and important nerve trunks which run down the neck. The hit on the larynx if given with the ungloved fist may cause instant death, due no doubt to irritation of the laryngeals and their connexions.

Blows on the body must be above the belt, which is placed about the level of the umbilicus. A severe blow delivered on the chest wall about the region of the heart may cause syncope and death. The agony is great, and very easily disables the man from taking further part in the contest. To have the worst results manifested, the muscles of the chest walls must be relaxed at the moment of contact, and the lungs in the condition of partial or full expiration; this allows the force applied to be brought almost directly to the heart wall itself, without the intervention of the elastic framework which is formed when the lungs are full of air and the intercostal and chest muscles braced up. Diaphragmatic blows are not as a rule so dangerous to life, as the shock produced is of a more transient character. There is collapse, with difficulty in getting breath and sometimes unconsciousness. Brisk rubbing is the most satisfactory treatment, warmth externally and, if necessary, stimulants. Blows over the kidneys are still I think inadvisedly admitted as fair, they are delivered with a swing, when the opponent is half turned, his side undefended and exposed. Great shock results, due, no doubt, to the intimate relationship of the kidney nerve supply with that of the sympathetic and central nervous systems. The pain is severe, and there may be hæmorrhage, with or without rupture of the capsule. In the old-time fighting with the bare knuckles the blow was most dangerous; great agony and even loss of life attended it.

The blow on the mark is a most dangerous one, and severe in its immediate and after-effects; in one memorable fight the man who lost the contest through being struck this blow was never the same again.

Captain Edgeworth Johnstone says in his book on *Boxing*, page 142: "The most dangerous and infinitely painful form of 'knock out' is that which is accomplished by a left hand hook on the mark." The popular idea is that it knocks the wind out of the body and thus produces painful gaspings for breath. The man struck falls to the ground, doubled up and gasping, he turns intensely pallid, face becomes drawn, he may vomit, strives perhaps to regain his feet, wriggles round and sinks back again, occasionally loses consciousness altogether, pulse weak and irregular, cold sweat breaks out on the face and body, shock is profound, nervous prostration pronounced and lasting, recovery slow and sometimes incomplete. The specially sensitive area on the abdominal wall termed the "mark," is the size of the palm of the hand, and corresponds with the centre of a triangle formed by the xiphisternal articulation above and a line joining the bony ends of the seventh ribs below; behind this lies the pyloric end of the stomach. We all know that injuries to, and operations on, the stomach are attended by more shock than is the case with almost any of the other abdominal organs. Edgeworth Johnstone says "the effects are due to irritation of the pneumogastric setting up cardiac failure." When we consider the nerve supply to the skin of this region and to the structures and organs beneath we readily come to a just explanation. The skin and muscles (recti) are connected by the lower dorsal nerves and splanchnics with the solar plexus which is related to the vagi in a ganglionic arrangement in the stomach walls (Auerbach); the intercostals and diaphragm likewise receive their nerve energy from a similar source. Thus we have a more complicated physiological condition of affairs than at first sight appears. The pugilist talks of a "knock-out blow on the solar plexus"; this is an impossibility, the stomach is