ON SOME DIFFICULTIES IN REFERENCE TO THE EARLY SURGICAL TREATMENT OF APPENDICITIS.

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Although discussions upon appendicitis have been quite numerous lately, I hope there is no need to apologize for bringing this subject up again. In view of the immense importance and the great interest which attach to this disease, and also of the *many points still entirely obscure and unsettled* in connection with it, and last, but not least, the continued existence of so many skeptics as to the prevalence of the affection as well as to the importance of its surgical treatment, it can not at present be discussed too frequently.

While it is true, that the surgical technique of the operation for appendicitis has reached, especially through the efforts of surgeons of this country, a state of perfection hardly to be excelled, it is to be regretted on the other hand that, as to the affection itself, particularly as to its etiology, diagnosis and prognosis, a vast number of errors still prevail. This deplorable fact appears to me to be the more important in that recently even the general press has taken a great and most unpleasant interest in this particular *locus minoris resistentiæ* of our medical knowledge. Thus an obstruction policy is raised against timely surgical interference, which doubtless handicaps the treatment of a great many cases.

As stated before, the technical part of the question before us has reached a state of most gratifying perfection. As soon as the abdominal cavity is opened, the further surgical strategy is, as a rule, clearly outlined.

If the operation is done for relapsing appendicitis, if, in other words, a simple appendicectomy is to be performed, no difficulty is encountered. Under the auspices of thorough asepsis, in fact, the prognosis is most excellent. The incision, at least four inches in length, should be made parallel with Poupart's ligament and with its center opposite the spina anterior superior ossis ilei. In this way enough space is secured to allow complete and safe work. The section of the musculus obliquus externus and of the aponeurosis should be made to correspond, care being taken by using blunt instruments (handle of scalpel, of closed Cooper's scissors) not to cut any fibers crosswise. If the parts, thus separated, are well re-adjusted after the operation, perfect union will take place. Thus formation of abdominal hernia will best be prevented. Care should naturally be taken to use the same blunt instruments for separating the fibers of the musculus obliquus internus and transversus, the direction of which is somewhat oblique to those of the musculus obliquus externus.

After the peritoneum is divided and the caput coli pulled out, the appendix is easily brought to view and removed. Care should always be taken to ligate the mesenterium of the appendix in several portions, before the latter is severed. Having carried out this precaution a reliable assistant presses the appendicular region of the cecum firmly together in order to prevent any outflowing of the intestinal contents, while with the scissors the appendix is snipped off very close to the cecum. Previous to the

separation, however, if palpation has shown the presence of fecal matter within the appendix itself, it is my custom to prevent its escape by surrounding the appendix with a ligature close down to the point of the intended division. (See illustration.) In case of insufficient assistance it is advisable to put a prophylactic suture around the base of the appendix between the point of the intended division and the cecum. This can be removed after the small opening is closed. The closing is effected by two to three Lembert's sutures of thinnest silk, inserted through the serosa. Perfect approximation is facilitated by stripping the musculo-serous coat somewhat backward to the cecum, just as the skin flap is retracted in a circular amputation, and cutting off the protruding mucous coat.

A small amount of iodoform powder is dusted into the inner surface of the stump, but the wound itself must not be brought into contact with any antiseptic substance. Silk is chosen for the peritoneal work, as

APPENDICECTOMY.

1, 2, Prophylactic ligature. 3, Cecum. 4, Stump. 5, Protruding mucosa ligature. 6, Lower portion of ileum.

well as for that of the abdominal wall, on account of its antiseptic reliability, which, in my mind, outweighs the otherwise considerable advantage of catgut.

The same principles hold good when extensive adhesions are found. These are divided. To gain more ground for safe work it will be sometimes advisable to add a second incision, rectangular to the first and running from its center toward the spina anterior superior ossis ilei. It is to be understood that union by first intention is striven at just as in a case of ordinary appendicectomy.

But an entirely different plan of treatment must be pursued if the inflammatory process has been followed by the formation of an abscess. Most fortunately, protecting adhesions are established in the great majority of such cases, creating a real empyema. (I would propose to call this pyo-appendix, in analogy to pyothorax, pyosalpinx, etc.) As this is practically an extraperitoneal abscess, it gives a most excellent

prognosis, as a rule, and is not to be compared in significance with that of a pus accumulation in the free peritoneal cavity.

The incision through the abdominal wall in such cases should be the same as described above. Then, after the peritoneum is reached, a grooved director is introduced in the direction of the abscess. As soon as pus appears in the groove of the instrument, a small Péan forceps is pushed in alongside the groove of the director. After the opening is gradually dilated, the cavity is exposed by holding back the tissues with blunt retractors. If the appendix is now found lying free in the cavity, its removal is a matter of course. The whole cavity is then packed loosely with iodoform gauze, which is then protected by a large layer of mossboard.

When, however, the appendix is gangrenous and is surrounded by strong adhesions, having become, in fact, a portion of the walls of the pus cavity, thereby shutting off the latter from the great peritoneal sac, the danger of its immediate removal would be very great. It is a well-adopted surgical principle to remove gangrenous tissue, wherever it may be, without delay. But like many other axioms this has to be taken *cum grano salis*. The punctum saliens will be here, whether the price paid for the removal of such an appendix is not too high. While it would certainly be desirable to see such a dangerous element eliminated, the breaking-up of the protecting walls would certainly entail the greatest possible risk of infecting the whole peritoneal cavity. Great is the difficulty of determining a border line between radical and conservative indications in such cases, and it will frequently be left solely to the surgical instinct whether the appendix should be hunted for and removed or not. The more radically disposed surgeon, eager to avoid possible recurrence, tries to get hold of the appendix, cost what it may. The conservative surgeon, eager to avoid infection of the general cavity by risky manipulations, is apt to satisfy himself too easily by simple evacuation of the liquid contents of the cavity, thereby assuming the risk of overlooking a second pus accumulation. It is deplorable that, so far, it has been found impossible to lay down a golden rule for the guidance of the surgeon at this herculean crossway.

If the gangrenous appendix is not removed, it should be carefully surrounded by iodoform gauze, in the expectation that it can be removed a few days later. Beside packing the cavity with iodoform gauze it is advisable to pour in about a tablespoonful of a 10 per cent. mixture of iodoform-glycerin.

If appendicitis has ceased to be a local infection and a general peritonitis is fully established, the surgeon is at a loss in the far greater majority of cases. Much, however, can sometimes be done by careful and extensive examination of the peritoneal cavity, the finger or grooved director being valuable diagnostic means. Such explorations, done if possible under anesthesia, frequently disclose conditions, which by superficial examination were not discovered, such as secondary abscesses between the loops of the intestine, etc. Here the treatment should be to thoroughly evacuate the abscess, wash out the peritoneal cavity with a hot saline solution, carefully wipe off the fibrinous exudations, and introduce iodoform gauze—preferably wicks, on account of their greater absorbent power—or small drainage tubes surrounded by iodoform gauze, as advised by

Miculicz. Such procedures will once in a while, even in bad cases, meet with astonishing success. Clinical experience has shown that recovery has taken place even when the surgeon proceeded to the operation without a spark of hope, where, for instance, the pulse was not perceptible. Vice versa, however, cases have ended fatally where the prospects were comparatively good. It is no doubt depressing for a surgeon to proceed to heroic manipulations under such circumstances. But it should not be lost sight of, that a patient suffering from general purulent peritonitis has, indeed, nothing to lose; he should therefore be operated upon at all hazard. The permission of the patient can be obtained almost always on account of his great suffering and his cognizance of the unfavorable outcome of treatment by internal

ABDOMINAL SCAR TWO WEEKS AFTER APPENDICECTOMY.

medication. It has been my experience that the trouble in getting the permission in such cases comes from the attending physician and not from the patient or his friends. Consultation and consideration usually consume most valuable time.

Extensive exposure of the peritoneal cavity enables the surgeon to evacuate the pus from pockets and crevices of the abdominal cavity and destroy adhesions which form the walls of small abscesses. These adhesions are generally the outcome of a previous inflammatory process, and often form a great impediment to the thorough evacuation of the pus. A thorough disinfection of the abdominal cavity is still a desideratum, but if at least a large quantity of infectious material is removed the degree of the toxic influence is considerably reduced. By thorough

evacuation also the intra-abdominal pressure is necessarily lessened, so that the respiration, as a rule, becomes much freer.

How much such heroic procedures as alluded to above can sometimes achieve, may be illustrated by a case of my own, the history of which I beg to submit (Compare Beck, "Tubercular and Suppurative Peritonitis," *New York Medical Journal*, April 21, 1894.):

Jacob W., aged 7 years, who had always been in good health before, was suddenly taken sick with chills and sharp pains in the region of the umbilicus. Vomiting set in a few hours later. Dr. Sandberg of this city, who was called in, administered laxatives and also washed out the stomach and bowels without effect; he was accordingly led to suspect ileus from intestinal obstruction and advised immediate laparotomy. When I saw the patient on the evening of May 17, 1893, I found a strong, well-nourished boy, showing the typical facies Hippocratica. The weak pulse was 131, temperature 101, and the respiration 32. The abdomen was tympanitic and very painful to the touch. Resistance or particular tenderness at the right iliac fossa was not present. After thorough aseptic preparations at the house of the patient, an incision, 5 inches in length, was made in the manner described above. About three tablespoonfuls of gray malodorous pus were discharged. The intestines were found glued together by fibrinous adhesions to the extent of about half of the peritoneal cavity. They were of a dark red color and could be brought to view only after a cross incision, rectangular to the original one, reaching nearly as far as the umbilicus, was added. Above the synchondrosis sacroiliaca dextra a second pus cavity was found and evacuated. By hunting for the appendix the cecum was found tightly adherent to the synchondrosis sacroiliaca dextra, from which I was afraid to separate it. It can safely be said, that fully two yards of the small intestine, covered with fibrin and purulent exudation, were carefully pulled out, washed with sterile water, and wiped with peroxide of hydrogen. Iodoform powder was dusted over all the portions of the intestine, which had been covered with exudations. The edges of the cross-incision only were united. One loop, about twelve inches in length, was kept outside the abdominal cavity, as it had a dark blue tint, which gave a suspicion of possible ensuing gangrene. It was enveloped in iodoform gauze and the fossa iliaca dextra was also packed well with the same material and the whole was protected by a large moss-dressing.

After the patient had rallied from the shock, his condition became quite satisfactory, until, five days later, pain as well as a considerable elevation of temperature induced me to examine the cavity closely by introducing my index finger, whereupon a retention of pus was discovered in the lumbar region. A counter-incision was made at once above the crista ossis ilei and a large drainage tube, surrounded by iodoform gauze, introduced. Great improvement followed this procedure. It was not ten days before I replaced the enveloped portion of the intestine. At the same time I again tried to find the appendix but in vain, and as the patient made rapid and satisfactory improvement, no further attempts were made to improve it.

Three weeks after the first operation the patient was seized with sharp pains in the region of the bladder; frequent micturition troubled him and his general condition became considerably impaired. No retention of pus could be detected, nor did examination through the rectum and the urine reveal anything in particular. The patient gradually became weaker, had incontinence of feces and several attacks of syncope. After I had conquered a good deal of opposition, the patient submitted to another operation. By pushing the index finger toward the bladder, adhesions were destroyed which had formed the walls of a cavity, extending from the posterior wall of the bladder to the rectum. Two tablespoonfuls of creamy pus were discharged. Forcing my index finger as far as possible toward the opposite side, I succeeded in incising on its tip, so that a drainage tube, nearly one foot in length could be pulled through. Great improvement followed this time also, and two weeks after a portion of the drainage tube was pulled out. This "post-vesical cavity" was now drained from the right side only, so that the counter-opening on the left side became obliterated. Contrary to my instructions the patient was allowed to get up and was taken sick again with chills and convulsions, the source of the trouble this time again being furnished by retention of pus in the same post-vesical

cavity. Drainage was again established as before, from the right to the left side. When the symptoms had subsided, the drainage tube was pulled out from the left side and the old right opening was allowed to obliterate. Two weeks later the drain was removed entirely and iodoform wicks substituted for another week, after which recovery became perfect. In the right iliac region a large ventral hernia is left, doubtless due to the weakening of the abdominal wall by the long continued drainage. As it does not disturb the patient, it is difficult to persuade him to submit to a secondary operation.

In this case the dangers arising from repeated pus retention were readily counteracted by energetic interference. So fortunate an outcome, however, must be regarded as an exception. Though we are well-nigh letter-perfect in the technique of operative treatment of appendicitis, we are deplorably ignorant of its etiology. If we accept Chauffard's dictum: "*Toute la thérapeutique est dans l'étiologie*," such ignorance may furnish the explanation of the uncertain therapeutic measures which are still adopted by many physicians at the early stage of the disease.

It is customary to say that the prognosis of the disease depends upon its toxic agent, but this is a rather defective explanation. Appendicitis may have its starting point in a simple inflammation of the mucous membrane of the cecum near the ilio-cecal valve. Such catarrhal process might easily extend into the appendix, and even though giving rise to no immediate symptoms might, nevertheless, produce a stricture of its lumen that would lead to retention, or it may even obliterate a part of the appendix (appendicitis obliterans). Even during such slight inflammation the patient is always exposed to the danger of peritonitis, be it caused by perforation or not. The protecting epithelium of the mucous membrane of the appendix might also become displaced or eroded, so that bacteria can easily invade the rich layer of adenoid tissue beneath, finding there most favorable conditions for their development. As the bacillus coli communis has its permanent domicile in this part of the bowels, and as it very frequently is found in pus cavities in or around the appendix, it was at first thought to be responsible for the trouble. But other microorganisms are also found in company with the bacillus coli communis, particularly the streptococcus. Welch advanced the theory, that it is the companionship of these two microbes which excites inflammation in this connection, and that the fact that the streptococci were not found should not be considered a sufficient proof of their absence. The colonies of the bacillus coli communis grow so much more rapidly and extensively than those of the streptococcus, that the much smaller ones of the latter may be completely overshadowed. But as both microbes exist in the intestines of every individual, certain conditions, still unknown to us, must arise in order to give these elements a chance to exert their infectious influence. Do such conditions exist in changes of the mucous membrane as alluded to above or in circulatory disturbances, caused by the curved and angular shapes of the appendix, by an insufficient supply of blood or by encysted fecal matter, particularly if previous catarrhal inflammation has left a stricture? Regarding foreign bodies as an etiologic factor, I must say that in about one hundred and fifty cases of appendicitis operated upon in my own practice, I have been able only once to discover one seed. For the last few years I have taken particular pains to search for the appendix in all my other cases of laparotomy, and have repeatedly found hard

masses, probably fecal matter, in the lumen appendicis in individuals who had never up to that time and have never since shown any symptoms of appendicitis. Slight pressure sufficed to press such contents out into the cecum. I have frequently asked myself in such cases, whether it were not my surgical duty to remove the appendix, but up to date I have not been able to convince myself of the necessity of such a radical step. Such observations, however, have led me to believe, that despite the absence of a circular muscular layer, circulation of fecal matter in the appendix is possible.

In considering the microbiotic theory of the causation of appendicitis we must also not overlook the fact that the micrococcus lanceolatus (Fraenkel), the bacillus pyogenes fetidus and other microorganisms are also found in the pus formations. Furthermore, in reference to the much-discussed bacillus coli communis, it must also be borne in mind, that according to the experiments of Kiessling (*Hygienische Rundschau*. Bd. 3, p. 724), what is usually called bacillus coli communis does not represent a single bacterial species, but that a great many intestinal bacteria are grouped under this head, which, though alike in several respects, differ distinctly in others. Apropos of the whole germ theory of disease, it will doubtless puzzle us for a long time to name the conditions under which the same streptococcus will set up a trifling tonsillitis in one case or a fatal meningitis or appendicitis in another. Nor will it be less difficult to explain why the same toxic elements in one case cause a circumscribed inflammatory process or a localized abscess, while in another they produce rapidly fatal septic infection. Undoubtedly there exist various forms of sepsis, which our defective means of diagnosis hinder us from differentiation. If we were cognizant of these conditions it might be possible to form a prognosis by bacteriologic test. During operation, of course, specimens can easily be obtained. Unfortunately, however, only a few microbes can be recognized by the microscope alone, so that no adequate conception either of the cause or of the amount of the sepsis can be formed. The great majority of microbes at present known can be made out only by bacteriologic examination, which has the disadvantage that the cultivation of most species consume so long a time as to be practically useless in this connection. Therefore, clinical experience, ocular inspection and the estimate of the general condition will more often furnish the grounds for prognosis as well as the indications for further surgical steps.

Difficult though it may be in many cases to determine the best course to pursue after we have opened the abdomen—how much more difficult is the decision before it has been done. Are the symptoms, so well known to us through the text-books, always sufficiently developed at an early stage; the stage which warrants success after surgical interference? The diagnosis of appendicitis is based upon the presence of acute abdominal pain, the suddenness of the attack, the tenderness and resistance at McBurney's point, the occurrence of nausea or vomiting together with more or less febrile disturbances. Increased temperature in itself is not a reliable symptom, but Madelung regards a marked difference in temperature between that of the mouth and that of the rectum in favor of the latter as peculiar to this disease.

But all the symptoms mentioned are at times

also found in other abdominal diseases. The surgeon's knife has frequently demonstrated the presence of appendicitis in cases in which a diagnosis has been made of psaos abscess of the abdominal wall, typhlitis, perityphlitis, paratyphlitis, salpingitis, oöphoritis, peritonitis, intestinal obstruction, typhoid fever, cholelithiasis, hepatic abscess, nephrolithiasis, and even of malaria, influenza or pneumonia. Very often the patient has reached the autopsy table before the error diagnosed has been discovered. The effect of these unfortunate mistakes has been to bring cases to the surgeon's notice at an earlier stage than formerly, and to throw upon him the responsibility of choosing between the danger of delay and the rashness of operating before the symptoms are sufficiently developed. Is it fair to expect that he will always choose aright? As explained above, he can not at that stage of the disease obtain sufficient knowledge of the toxic agent and of its significance and localization. Is it possible, for instance, to recognize a small ulceration in the appendix or to distinguish it from a so-called benign catarrhal process? There is, as a rule, not a single reliable symptom for differentiation. As soon as perforation has taken place the symptoms become violent enough to leave no doubt—but then the disease is no longer appendicitis but peritonitis.

It has always seemed to me, however, that the thing to be feared in cases of appendicitis is not as much the danger of perforation as the possibility of septic infection from the original seat of inflammation. If this be so, early operation would seem to offer the strongest, frequently the only chance of success. This would imply that the surgeon should operate even during the first twelve or twenty-four hours. A family physician holding this view might be disposed to urge immediate operation. But woe to the surgeon, if his expectations are not realized after the abdomen is opened. It has happened, that just he who urged most strongly, will be his most pitiless critic, shifting all responsibility upon his shoulders. If, on the other hand, the surgeon defers the operation until the symptoms become more manifest, any unfavorable result will subject him to the same ungrateful treatment. I have a vivid recollection of a 6-year-old boy who, after having swallowed a considerable number of orange seeds, was suddenly seized with sharp pains in the right iliac fossa. Vomiting and slight convulsions set in shortly afterward. His temperature was 106 F., pulse 144 and respiration 42. Tenderness at McBurney's point being also discovered the family physician, quite naturally, made a diagnosis of appendicitis. The fact that the boy's abdomen had been jumped upon by a companion during play seemed to add further weight to this opinion. A well-known surgeon of this city was called in on the same day, but as he could not ascertain any marked resistance in the right iliac fossa, advised expectant treatment. The right leg of the patient, by the way, could be lifted without causing any pain. I had a chance to see the patient at the same time. A general examination of the patient gave me the impression of a pulmonary disturbance, the difference in the percussion note, however, being only slight. It was agreed to call in a specialist for lung diseases, who, upon examining the child on the following day, made the diagnosis of pleuro-pneumonia. [Three weeks later I resected a rib for pyothorax; recovery.]

This case is simply a sample of many of the cases in which a surgeon is called to operate for appendicitis where no appendicitis exists. They all serve to show that physicians have learned that procrastination in the surgical treatment of appendicitis is a dangerous thing. And yet, while in the case described above, a laparotomy, although in this connection an unfortunate procedure, would perhaps have been justifiable, in other cases a thorough general examination would have been sufficient to show the inadvisability of operation. It seems to be the opinion of some physicians that, if any trouble arises in the region of the right iliac fossa, no further testimony as to the existence of appendicitis is required. For instance, I was recently called by a most able brother to see a young woman who, six weeks after confinement, was supposed to have acquired appendicitis. There was acute pain in the right iliac fossa, distinct tenderness, vomiting, constipation and slight fever. If I had suggested an operation the family physician as well as the family would have consented at once. Examination of the sexual organs had previously been proposed by the physician, but the patient had stubbornly refused it. Having finally overcome these objections, however, we easily made out a salpingitis, undoubtedly due to the confinement.

In this connection let me say, that in operations for salpingitis I have repeatedly found the appendix participating in the inflammatory process, its end being sometimes soldered to the ovary. I have several times removed ovary, salpinx and appendix together, imbedded in a colloid mass. In such cases, which naturally were preceded by inflammation of long standing, particularly after confinement, the peritoneum was partially resected, as it was found considerably thickened. All these cases turned out well.

Considering all the points alluded to above, it is doubtful whether the time will ever come when it will be possible to make a rational prognosis of the course of appendicitis through its early symptoms, particularly as to whether the case will be one that will "heal spontaneously." This much, however, should be maintained, that appendicitis should not be looked upon as a medical disease up to the time that it has reached an "operative stage." It should not be left to the family physician to call in the surgeon when he wishes him to operate, thus putting the surgeon in a most undesirable position in relation to the case. It should not be left to the family physician to decide whether the operation is to take place at all or when; but the surgeon should bear the full responsibility from the very beginning. An illustration of the fairness of such demand may be furnished by the following case:

A man, 37 years old, a builder of this city, while on a vacation in the Alleghany mountains, had an attack of appendicitis, which was recognized as such by his physicians at an early date. Medical treatment was advised. As the patient himself was aware of the dangers of his disease and also of the advisability of early operation, he demanded a surgical consultation. His condition having improved two days after the onset of the disease, a report was sent to me by the physician, saying that the necessity for an operation had fortunately ceased, but if against all expectations my surgical assistance should be wanted a telegram would be sent me. On the following morning they summoned me to operate. After

having gone more than one hundred miles of my journey, I received a dispatch on the train telling me not to come, as operation was unnecessary. Thinking that the patient had succumbed to the delay, I returned. Two days later, to my great surprise, the patient appeared in my office, telling me that on account of his great improvement two days before, after he had had another severe attack, the physicians had persuaded him to keep surgical interference at a distance. This morning, although he had had another attack of violent pain and was feeling very weak and nauseated, he had made up his mind to risk leaving for New York, a journey of ten miles on mountainous roads and six hours' travel on the train. In examining him I found all the classical signs of appendicular abscess, particularly the pain and the presence of a tumor in the right iliac fossa. His temperature was normal, pulse 76 and respiration 29. He could only walk in a bent position. At the operation, which was performed on the following day, a gangrenous appendix was found, loosely attached to the hard walls of a cavity which contained a pint of yellow creamy pus. The wall of this cavity completely excluded it from the cavum peritonei. The opening left in the cecum after the removal of the appendix could be closed only with great difficulty. Two days after operation feces were found in the cavity, indicating the presence of a fecal fistula which, however, became obliterated two weeks later. With this exception recovery was uninterrupted.

In this case the diagnosis was made at the proper time and therefore immediate operation was indicated. The physician who advised procrastination may feel excused by the fact, stated by so many capable men, that a number of cases of appendicitis recover without operation and that the appendix was repeatedly found healthy when an operation for supposed appendicitis is performed. In reference to the first point, however, there is a doubt whether the diagnosis is covered in those cases of appendicitis which are said to heal spontaneously, and, furthermore, whether such recoveries are not temporary and whether the fortunate outcome at a time has not to be dearly paid for by a sudden perforation or spreading infection in a second attack.

In reference to erroneous surgical diagnoses it may safely be maintained that they can fairly compare with those made by the pillars of general medicine. The few surgical mistakes made in this connection are well offset by the numerous fatal cases of appendicitis, not recognized and consequently not operated upon, which, if they had been given the advantage of an early exploratory incision would probably have recovered.

Weighing all the numerous difficulties alluded to, I may summarize my conclusions in that, if there is any doubt as to the presence of appendicitis at an early stage, an unnecessary exploratory incision is by far the lesser evil.

Another Fatality Chargeable to Athletic Sports.—A press dispatch from Salem, Mass., states that a young man, aged 25 years, died Dec. 6 from the effects of being struck on the head by a polo ball at the Salem and Fall River game. He did not complain of the injury until after reaching home. Medical assistance was procured, but it was of no avail. Serious injuries to polo players are not infrequent by reason of falls and collisions, but fatal accidents are not so common as might be expected. We do not remember heretofore to have seen a reported death chargeable to a blow from a polo ball.