of characteristic A. tums operation, patients, the made has cholecystostomy stones, in in children. needed that they are concerning the humidity are considerably absorbed just so much oxygen and it does not make much difference whether we give compressed air or forced oxygen to children; but the out-of-door-air plus the cold or the lowered humidity is perhaps that which gives the good results in the winter as against the summer. In the use of the salines in fever, spoken of by Dr. J. Madison Taylor, the fever may be reduced by the evaporation of perspiration induced and the results show the good effects of the salines. Dr. Pisek said that he is glad to know about the cooling plant of the Boston Floating Hospital. He thinks that this is just the thing needed in solving the problem of taking care of sick children in summer. Relative to Dr. Rothe's remarks about taking the children off of milk feeding, he said that he has noticed that they do not nurse and the circulation of air greatly helps. We can give sterile water before nursing has seemed to benefit.

INDICATIONS FOR SURGICAL INTERVENTION IN INFECTIONS OF THE BILIARY TRACT.*

JOHN B. DEAVER, M.D., PHILADELPHIA.

Prolonged experience with diseases of the biliary tract has convinced clinicians of the truth of the statement made by Terrier that the origin of all such diseases is in some form of bacterial infection. The exhaustive studies of Naunyn, showing the invariably infectious origin of gallstones, have led the way to appreciation of the second important truth, that the calculi are merely an incident of the disease, and are by no means universally present in diseases of the gall bladder and the bile ducts. The statistics of my own cases1 correspond in this respect very closely with those of other surgeons. Of 216 patients, 84, or 15.8 per cent., had no gallstones.

In conjunction with this fact it should ever be borne in mind that many, possibly a majority of the attacks of biliary colic are not due to the acutal passage of gallstones, but rather to a spasm of the gall bladder caused by acute cholecystitis in the presence of ducts constricted by inflammatory swelling. Kehr has spoken very positively on this point, and has even gone so far as to produce biliary colic experimentally in his patients, after operation, by injecting their gall bladders through the cholecystostomy wound and finding that acute over-distension of the gall bladder causes precisely those symptoms which have been known for generations as characteristic of biliary colic. I have repeatedly seen this occur when washing out the gall bladder through the cholecystostomy sinus. It is noteworthy that of 161 of my own patients who had colicky pains, no less than 24, or 14.9 per cent, had no gallstones; and of 45 patients who had non-colicky pains, 10 or 22.2 per cent. had no calculi—in other words, of 206 patients with pain, 34, or 16.5 per cent. had no calculi.

Although gallstones are excessively prevalent (Kehr says every tenth adult body exhibits them) yet they do not, fortunately, in every case produce symptoms. If this were not the case, "every theater, every church, every concert-hall," as has been well said, "would resound with lamentations" from patients suffering with this disease. And hence even the most enthusiastic surgeons must recognize that every patient does not require operation. Kocher very pointedly says that gallstones do not "belong" to the surgeon. As he remarks: "They belong in the first place to the patient, and if he prefers to retain them and to drink Carlsbad waters as well, he is quite within his rights to adopt this method, a line of treatment which, as is well known, is followed even by many surgeons when they themselves have gallstones."

In the same way Kocher continues: "If a patient prefers to wait in suffering and pain for a stone to work its way down per vias naturales, he is but enjoying his personal privileges. But at the present day the surgeon is certainly justified in telling a patient with gallstones that by an operation he can be quickly and safely cured of his trouble and be saved from eventual danger more rapidly and more easily than by any other treatment."

It is, then, one of the most important functions of the surgeon to decide which patient shall and which shall not be urged to seek relief by operation, and while there are certain indications which are universally recognized as pointing one way or the other, there still remain enough disputed points to provoke interest and instructive discussion.

I am in favor of removing gallstones in every case in which they are known to be present, provided, of course, that there are no contraindications which would render any operation injudicious. But when operation is done in the early stages of the disease, when inflammatory changes are merely catarrhal in character and the stones are confined to the gall bladder, the operation is so free from risk and the results are so satisfactory that it appears to me to be courting disaster to postpone surgical intervention in the hope that the symptoms will subside and never again recur. Dr. Kelly's statistics show that among my 216 patients, 133, or 63 per cent., had had previous attacks of jaundice; and, as jaundice is an unusual rather than a customary accompaniment of biliary infection, it is evident that there must have been more than one attack of biliary infection in the vast majority of patients, though I regret that I have no figures to offer on this point.

When I state that I consider the presence of gallstones an indication for operation, other things being equal, I do not mean to include in this category the large number of cases of non-calculous cholecystitis which are constantly seen by the physician. When a patient is seen with a frank attack of acute cholecystitis which does not subside under judicious medical treatment pursued for from thirty-six to forty-eight hours. I think that then the safest course is to do a cholecystotomy at once; this is especially true if the attack is not the first, and it is to my mind nearly imperative if we believe from the history that calculi also are present. But when the cholecystitis is mild in character and

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1. I take this opportunity to express my indebtedness to Dr. A. O. J. Kelly, pathologist to the German Hospital, for permission to use the material presented by him in the Mitter Lecture of the College of Physicians of Philadelphia, for 1906, which is based on the records of 216 patients with infections of the biliary tract operated on by me at the German Hospital.

yields promptly to medical treatment, and the patient is having his first attack, then I think operation may well be postponed until further symptoms arise. Calculi are probably absent in such mild cases in early attacks, and although it can not be denied that gallstones may form in the course of a comparatively few hours, yet such patients seem to me particularly suited for the so-called Carlsbad cure. Patients in the poorer classes, of course, can not go to Carlsbad for the cure, and many others are unwilling to, or further than Saratoga, the Virginia Hot Springs or the Bedford Springs of Pennsylvania, the Carlsbad of America; but even those who can not leave home can drink the waters and can regulate their diet and their bowels so as materially to improve their general health.

When the attacks of cholecystitis are repeated, and especially when discomfort persists in the intervals, operation is demanded to obtain a cure. The frequency with which mild but recurrent attacks of cholecystitis give rise to pericystic and pyloric adhesions is not duly appreciated by the profession. Many a patient who has suffered once or twice from mild attacks of catarrhal jaundice, so-called, without evident implication of the gall bladder, will be persistently troubled by periods of anorexia, of flatulence or of actual nausea; and in time gastric or duodenal ulcer will appear, often enough, I doubt not, engrafted on a stomach whose motility has been seriously hampered by adhesions originating in disease of the bile passages. Only recently I removed the greater portion of the stomach from a woman whose gastric cancer was engrafted on a chronic ulcer, this being only one of other cases of the kind occurring in my experience, and from the perigastric adhesions and from the presence of a gall bladder completely filled with gallstones, in addition to a large stone in the common duct, the inference was clear that the bile ducts and the gall bladder were in her the starting place of the whole series of lesions in the upper abdomen. The gall bladder and the common duct were opened, the calculi removed and the gall bladder and common duct drained by a stab in the right semi-lunar line, permitting complete closure of the wound through which the operation had been done. Recovery and freedom from digestive disturbance followed.

In the later stages of gall-bladder disease operation is almost invariably demanded, but so long as the serious lesions are confined to the gall bladder the mortality due to the operation is small. In hydrops of the gall bladder, cholecystectomy is required, since obliteration of the greater portion of the duct renders the gall bladder not only useless, but a continued menace from the liability of re-infection or even of rupture. Empyema requires cholecystectomy only when of long standing, with the result that the cystic walls are irreparably diseased. If the empyema be acute, drainage of the gall bladder suffices, and in cases of doubt cholecystostomy is to be preferred to the more serious operation. Gangrene of the gall bladder naturally requires its excision, and the same is often true of perforation, since this latter condition occurs most frequently when the gall bladder walls are extensively diseased.

When we come to a consideration of patients in whom gallstones are believed to exist we have to do with a much more serious disease. If the calculi can be removed by operation before they have had a chance to wander from their natural habitat—the gall bladder— the patient is to be considered greatly favored. The operation then is no more serious than that for non-calcificous cholecystitis. But when a stone descends into the cystic duct, and still more when it is blocked in the common duct, or if by chance one lies in the hepatic duct, then must the patient be considered in serious danger. The mortality of operations from these conditions is markedly higher than that of operations for disease confined to the gall bladder; but as the disease under the former circumstances is, without operation, very much more fatal than is the operation itself, no conscientious surgeon can hesitate to recommend the latter form of treatment.

In spite of the very positive evidence which is now available of the futility of the attempt to dissolve biliary calculi by internal medication, there are still some who employ olive oil with this object in view. As Dr. Kelly in his lecture well says: “We now know that the thousands of gallstones said to have been passed by the bowel after the administration of olive oil and similar preparations are merely masses resembling gallstones in outward appearance and due to the basely deceptive powers of the olive oil acquired in its passage through the intestinal tract.” And it is to be remembered that not only are the stones commonly multiple, but many of them are so large that their passage through the ducts is a physical impossibility; and although in long-standing cases of cholelithiasis large calculi are occasionally discharged into the bowel by way of cholecysto-enteric fistula or into the stomach by way of a cholecysto-gastric fistula, yet any physician who would anticipate with pleasure such a solution of the difficulty would be more fit for medieval days of alchemy than for those of modern medicine or surgery. Even when such a calculus has passed into the intestines it may still be provocative of intense mischief, and by causing intestinal obstruction may necessitate a far more serious operation than would have been the prompt removal of the calculi from the gall bladder and drainage of the infected area. Dr. A. C. Wood, of Philadelphia, only about a year ago collected twenty-two operations for intestinal obstruction by gallstones, and at least five (Michon, Gordon and Wright, Smith, Milward, Powell) other such operations have been recorded since that time. Korte observed fifteen such cases among about 500 patients operated on by him. My experience embraces two cases of obstruction of the small bowel by gallstones. Moreover, even were all the calculi to be safely passed through the intestines by medical means, the infection of the gall bladder would in most cases not only persist, but would soon cause the formation of other calculi, and the last state of that patient would be as bad as his first.

The underlying condition in all cases of cholelithiasis is the infection, and until physicians can combat that as successfully as surgery does, the less they have to do with acute complications of gallstone disease the better. As Dr. Kelly points out in his Mitter lecture, “the favorable results of medicinal treatment in the vast majority of instances by no means indicate the cure of the disease, but merely the restoration of latency”—and, although this is “by no means an undesirable achievement,” it is far from the summum bonum, which can only be attained by operative means. I can not refrain from calling your attention to the fact, however, that cholelithiasis can remain latent until Nature places the patient asleep in the everlasting rest of the grave.

The greater safety of operations during the late stage of disease in the upper abdomen is as noticeable
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in cases of calculi impacted in the bile ducts as it is in those done during the intervals of gastric hemorrhage, and hence it is that when acute impactation of a calculus occurs in the common duct by almost unanimous consent prefer to postpone operation until the event of the attack is assured. If the calculus, as sometimes happens, successfully passes into the duodenum, immediate operation is unnecessary, and in the majority of instances the calculus, if not thus disposed of, rests at ease in the common duct, causing intermittent obstruction and making its presence known by a fairly well-recognized group of symptoms. In this stage of the disease the offending stone can be removed with the least danger to the patient and the greatest satisfaction to the surgeon. The operation, which often involves tedious dissection and may consume considerable time, can then be done with deliberation and thoroughness—matters that are not always characteristic of operations on patients who are acutely ill.

In chronic impaction of a stone in the common duct the surgeon should not delay operation long. The varying size of the liver should be attentively watched and surgical intervention should never, if it can be avoided, be postponed until atrophic cirrhosis has set in. It is well known that such patients stand any operation much better, more readily than those in whom the liver is enlarged.

Without entering in detail into the technic of operations for removal of stones from the common duct, I desire to protest against the indiscriminate resort to cholecystectomy in cases in which the gall bladder is not irretrievably diseased, but in which the surgeon may consider it a useless appendage. When a calculus is removed from the common duct, I think retention and drainage of the gall bladder a very valuable adjunct to the after-treatment. When prolonged drainage is desirable—and in these patients it frequently is—the gall bladder can be stitched to the parietal peritoneum or even to the sheet of the rectus muscle, and thus a biliary fistula will be maintained long enough to drain the smaller hepatic ducts and to restore the patient to health. When the gall bladder is removed, apart from the increased immediate danger of infection and hemorrhage, drainage of the liver can not be so thorough as it is when the gall bladder is attached to the abdominal wall, and serves as a drainage tract in addition to that provided by a tube in the common duct at the site of the cholecystotomy. When the infection has traveled beyond the gall bladder and involved the hepatic ducts, or if the cystic duct is very much infiltrated, it is my practice not to content myself alone with drainage of the gall bladder, but to drain the common duct as well. Exposure and drainage of the common duct (in the majority of instances) I do not consider a difficult or dangerous procedure, yet it should be only judiciously done. Thorough operation alone can suffice to accomplish a cure; therefore incision, digital and instrumental examination to determine that the ducts are clear of any possible obstruction is required in not a few cases. Make-shift operations have no place in dealing with affections of the biliary apparatus.

In spite of his wishes, the surgeon is occasionally forced to operate on patients with acute impaction of a stone in the common duct. Perhaps, instead of the term impaction, the expression absolute obstruction would be better, since the condition may have persisted for some days, and hence be no longer technically acute. When a patient presents the history and usual symptoms suggestive of acute impaction in the common duct, and has in addition evidences of progressing infection, such as persistent jaundice, intermittent fever and sweats, the only chance of salvation frequently lies in immediate operation. And yet the mortality of such operations is appalling high. The acute hepatic infection, evidenced by enlarged, tender liver, by the jaundice and the fever, is a serious condition in itself, and the danger of hemorrhage in these patients adds to the seriousness of the case. Even with energetic stimulation and the routine administration of calcium chlorid (gr. 10 every four hours) for a day or so before operation, and the continued administration of this drug in larger doses by the rectum after the operation, many a patient dies from uncontrollable capillary oozing before the period when death from sepsis is to be feared. I question if calcium chlorid does any good, as the patients I have lost all had the benefit of this drug. I may remark, however, that the fatalities from hemorrhage occurring in my hands have not been the jaundice of gallstones, but the jaundice of advanced pancreatic disease, particularly carcinoma, too often the result of gallstone disease.

Not only do dangers such as these threaten in the biliary tract, but the pancreas may also be involved. There is good reason to believe that acute pancreatitis is often caused by impaction of a calculus in the diverticulum of Vater, by which means the infected bile is dammed back into the pancreatic ducts, and when a calculus is impacted only a little higher, so as to occlude the duct of Wirsung by pressure only, and thus merely hinder the outlet of the pancreatic secretion without forcing the bile up the pancreatic duct, we often have chronic pancreatitis as a result. The reason that calculi so impacted do not often cause disease of the pancreas is because in two-thirds of cases there is an accessory pancreatic duct (duct of Santorini), and in 10 per cent. of patients the common bile duct and the duct of Wirsung empty into the duodenum by separate orifices. In the cases these anatomic factors are not present, operation, serious as it is, is urgently demanded not alone by the cholangitis, but by pancreatic involvement as well.

The well-to-do patients suffering from chronic impaction of a calculus in the common duct may be able and willing to take the risk, which should be explained to them, of postponing operation until the Carlsbad cure has been tried. But the patients who can not afford such luxuries can not afford to lose any time waiting for a cure by any other means, and should be operated on at once. By taking the Carlsbad cure once every year certain persons will succeed in restoring a certain degree of latency to the cholangitic symptoms; but if these symptoms recur in spite of such treatment, further palliation will be practically useless.

As to the frequency with which calculi are found in various parts of the biliary apparatus, the figures appended to this article, taken from Dr. Kelly's statistics of my patients, may prove of interest.

Out of 182 patients with calculi there were 153 (or 84 per cent.) who had stones in the gall bladder, of whom 52 had stones elsewhere as well; there were 31 (or 17 per cent.) who had stones in the common duct, of whom 12 had stones nowhere else; there were 17 (or 9.3 per cent.) who had stones in the cystic duct, of whom 11 had stones nowhere else, and there were only 9 (or 4.89 per cent.) who had stones in the hepatic duct, and all of these patients had stones in the common duct and in the gall bladder as well.
Finally, there are several matters of interest in regard to typhoid cholecystitis. Among the 216 patients whose cases Dr. Kelly had studied, there were seven (all women) from whose gall bladders the typhoid bacillus was isolated. "In four no history of previous typhoid nor of concurrent typhoid fever (in the commonly accepted sense) could be obtained." When the symptoms of acute cholecystitis occur during the course of typhoid fever the question of operative interference naturally arises, and in most cases I think it is wise to treat these patients medically unless very positive evidence exists that the cholecystitic process has gone on to suppuration or to some more serious complication.

Not infrequently an enlarged and tender gall bladder can be detected during typhoid fever without there being any subjective signs of cholecystitis. As it is extremely probable that the typhoid bacillus invade the biliary tract in nearly every case of typhoid fever, the only wonder is that this disease has not heretofore assumed more importance as a predisposing cause of cholecystitis and gallstone formation. I do not know what proportion of patients with infections of the biliary tract have a history of previous attacks of typhoid fever, nor whether the incidence of gallstone disease is greater among such individuals than among the populace at large, but it certainly seems that it will be important for us in the future to inquire into these matters. Patients who have given evident symptoms of biliary involvement during typhoid fever would, if possible, be operated on by cholecystostomy after their recovery if any symptoms persist. Not only may serious future disease be thus prevented in the patients themselves, but the dissemination of typhoid infection from their intestinal tracts will be more effectively prevented. Drainage to accomplish good in infection of the biliary tract must be instituted early and be prolonged. It is in this class of cases in particular that I insist on and carry out tubeage, not only of the gall bladder, but of the common duct as well. The mortality after the use of tube in the common duct is no greater in my hands than that of the gall bladder.

I append the statistics as compiled by Dr. Kelly of the 216 cases referred to as operated on in the German Hospital:

**DR. KELLY'S STATISTICS.**

**Of 216 patients:**
- 162 (44.2%) had gallstones, and
- 54 (15.9%) had no gallstones.

**Of 192 patients that had gallstones:**
- 101 (58.3%) bad stones in gall bladder alone;
- 20 (12.5%) had stones in gall bladder and cystic duct;
- 10 (10.3%) had stones in cystic duct alone;
- 11 (6.0%) had stones in common duct alone;
- 5 (2.9%) had stones in both gall bladder, cystic, hepatic and common ducts.

**Of 216 patients:**
- 58 had no stones in gall bladder, and of these 23 had stones in the ducts;
- 41 had stones in common duct, and of these 12 had stones nowhere else;
- 9 had stones in hepatic ducts (as well as elsewhere).

**Of 216 patients:**
- 123 (57.8%) had adhesions about gall bladder;
- 22 (10.7%) had no adhesions, and of these 71 (26.9%) there is no note in the case histories of presence or absence of adhesions.

**Of 216 patients:**
- 101 (74.0%) had colicky pains;
- 45 (27.7%) had gallstones, and
- 4 (2.2%) had no gallstones.

**Of 3 patients that had no pains whatever, 2 had gallstones**
- 15 patients never had colicky pains nor jaundice, and of these 12 had gallstones, and
- 3 had no gallstones.

**The jaundice.**

**Of 216 patients:**
- 139 (63.9%) had jaundice at some time or other;
- 74 (34.2%) never had jaundice; and of these
- 4 (1.9%) there is no statement as to occurrence of jaundice.
- 54 (49.1%) had jaundice at operation and previous attacks;
- 10 (4.6%) had jaundice at operation and no previous attacks;
- 67 (31.0%) had previous attacks of jaundice, but no jaundice at operation;
- 4 (1.9%) had jaundice at operation, but there is no note as to whether or not there were previous attacks;
- 71 (33.3%) had jaundice at operation.

**Of 60 patients that had no gallstones, but no jaundice:**
- 44 (73.3%) had colicky pains;
- 12 (20.0%) had no colicky pains; and in
- 4 (6.7%) the character of pain is not accurately described.

**Of 11 patients that had no jaundice and no gallstones:**
- 8 (72.7%) had no colicky pains, and
- 3 (27.3%) had colicky pains.

**Of 34 patients that had no gallstones:**
- 12 (35.3%) had no jaundice at operation, but did have previous attacks;
- 11 (32.4%) never had jaundice;
- 9 (26.5%) had jaundice at operation and previous attacks;
- 1 (2.9%) had jaundice at operation, but no previous attacks;
- 1 (2.9%) there is no statement as to occurrence of jaundice.

**The size of the gall bladder.**

**Of 216 patients, in:**
- 88 (40.7%) gall bladder was enlarged;
- 72 (33.3%) gall bladder was normal in size;
- 32 (15.0%) gall bladder was small and atrophic; and in
- 40 (18.6%) size of gall bladder is not mentioned in case histories.

**Of 88 patients in whom gall bladder was enlarged:**
- 74 (84.0%) had gallstones, and
- 14 (16.0%) had no gallstones;
- 49 (56.0%) had jaundice;
- 30 (41.0%) had no jaundice; and in
- 5 (6.0%) the presence or absence of jaundice is not mentioned.

**Of 9 patients in whom gall bladder was normal in size:**
- 7 (77.7%) had gallstones, and
- 2 (22.3%) had no gallstones;
- 7 (77.7%) had jaundice, and
- 2 (35.3%) had no jaundice.

**Of 52 patients in whom gall bladder was small and atrophic:**
- 30 (92.3%) had gallstones, and
- 2 (6.0%) had no gallstones;
- 25 (76.1%) had jaundice, and
- 7 (21.9%) had no jaundice.

**Of 87 patients in whom size of gall bladder is not mentioned:**
- 71 (81.6%) had gallstones, and
- 16 (18.4%) had no gallstones;
- 67 (75.4%) had jaundice;
- 29 (33.4%) had no jaundice, and in
- 1 (1.1%) presence or absence of jaundice is not mentioned.

**CAPILLARITY IN INTESTINAL SUTURES.**

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**SALIDA, COLO.**

The histology of intestinal repair has been most comprehensively studied and described by many investigators, such as Warren,^1^ Senn,^2^ Murphy^3^ and many others. The strength of the union has been determined by its resistance to hydrostatic pressure, in the observations of

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