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OBSTRUCTION OF THE GALL-DUCT

AND ITS BAD CONSEQUENCES,

WITH

REMEDIAL OPERATION SUGGESTED.

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Any interruption in the discharge of biliary matters, whether the cause may be spasmodic, organic or mechanical, brings serious trouble in its train. The entrance of a calculus into the bile-duct is manifested by grave disturbance of the nervous system, and phenomena are soon developed which indicate the sympathy of the whole organism with the local difficulty. At the outset rigors alternate with flushes of heat, followed by cold sweats and the most intense suffering.

The ordinary acute spasmodic paroxysms of pain in the right hypochondriac region, attended with the most distressing nausea and vomiting, are familiar to every practical observer of any experience. These results, from the passage of calculi of greater or less dimensions, are known as hepatic colic. If the transit of this mass of indurated bile along the common gall-duct from the gall-bladder into the duodenum is effected promptly, all the trouble passes without any serious consequences. Should, however, the resistance to the progress of the biliary calculus be great, and its delay in the canal be much protracted, constitutional disturbance is manifested, and local inflammation in the immediate proximity of the arrested body will be speedily developed.

If curative measures are resorted to early after the interruption to the flow of bile, there is a good prospect of evacuating the gall-bladder. A dilatation of the ductus choledochus may permit of the passage of gall-stones of the size of an ordinary plum-seed, and the results which have been reported recently under the olive oil treatment commend themselves to the favorable view of the profession at large. The tendency to form biliary concretions being presented, if one calculus is discharged others are proven to take its place after a time, and the local and general embarrassments continue. An obstruction to the gall-duct may result from the actual presence of calculi in

the canal, or may ensue from infiltration of its walls, causing occlusion of the passage. When the impediment is simply mechanical in the outset, this by continuance becomes a source of irritation, and subsequently of inflammation in the tissues. Hence, there is never perhaps any protracted obstruction to the outlet of the bile without inducing some thickening of the walls of the duct, and, ultimately, agglutination of its adjacent surfaces.

When the obstruction has gone to the point of agglutination by the effusion of coagulable lymph, it will be found impracticable to combat the adhesive inflammation of the tissues, and the canal remains impermeable. When the ordinary channel becomes thus closed, it may occur that an artificial opening will be effected by an ulcerative process between the gall-bladder and the duodenum or the adjacent portion of the small intestine, thus remedying the difficulty temporarily, if not permanently. An outlet is afforded in this way to the biliary concretion or collections of fluid bile, and even sero-purulent discharges have taken place through such an ulcerated communication between these parts.

It has been ascertained that the closure of the material route of exit for the bile is followed by an inspissation or thickening of this fluid, and that eventually masses of bilious formation exist in the sac without assuming the character of a well-defined solid. Again, in the event of disorganization taking place there may be an exudation of a vitiated and decomposed fluid from the internal surface, or there may be a purulent accumulation within its cavity. Such collections lead to the destruction of its walls, and ultimately to their dilatation and extension below the margin of the liver, and, after the lapse of time, to the protrusion of the gall-bladder downwards into the lumbar region of the anterior portion of the right side of the abdomen. It presents under these circumstances an oblong, fluctuating tumor, extending down to the level of the umbilicus, or even into the right iliac region, with a breadth of from four to six inches, or even larger, according to the quantity of the fluid contained in the sac.

The retention of the bile for any considerable time without undergoing decomposition leads to its absorption into the circulation, and its diffusion generally through the system, so that jaundice is one of the ordinary accompaniments of biliary obstruction, but not a necessary or regular sequel of occlusion of the bile-duct. Should there be present in the cavity of the sac, in place of bile, some decomposed fluid or regularly formed pus, it is evident that no bile can be taken up by the absorbents, and as a natural consequence there would not be jaundice.

Should any one suppose that the analogy of bilious diffusion ought to lead to the dissemination of pus or other exudations, I would call their attention to the general law that holds in all suppurating cavities presenting a barrier in the peculiar modification of their internal surfaces against the absorption of their contents. Were not this pathological principle in force during the progress of suppuration in all parts of the body, there could not occur an abscess without purulent absorption, and, as a consequence, septicæmia. If decomposed fluids or pus are brought directly in contact with the areolar or cellular tissue, trouble ensues; but if retained within the cavities when formed, there is no contamina-

tion of the tissues. It has been noted as one of the almost invariable elements of bilious diffusion in the system, that itching over the surface develops with the obstruction, and is relieved with its disappearance. They may, perhaps, be considered as pathognomonic of the disorders. As a consequence of occlusion of the gall-duct, there is a want of bile in the intestinal canal, and the fecal evacuations are lighter-colored than natural, and owing to the absence of this stimulus to the peristaltic action of the bowels there is a torpid state of the alimentary canal. Even in an acute paroxysm of hepatic colic, when the interruption to the flow of the bile is only temporary, there is observed to exist a marked torpidity of the intestines, so that it is difficult to obtain the purgative effect of medicines when administered by the mouth. The use of enemata is more successful generally in such cases in evacuating the bowels, as their cathartic influence is brought to bear immediately upon their mucous surface.

The appropriate sphere of the bilious secretion is brought into operation after the gastric digestion is completed. The bile only becomes a proper admixture for the alimentary mass after it passes out of the stomach, and if from any cause there should occur even a very limited regurgitation of bile into that organ, it gives rise to disorder in the performance of its office for digestion.

The bilious matter, combined with the pancreatic juices in the duodenum, co-operates with it in modifying the diversified ingredients which enter into the homogeneous mass of the chyme, so as to fit it for restoring the waste elements of the decomposition in the materials subjected to the process of assimilation. After having effected the requisite changes in the alimentary mass, the presence of the reflux bile serves to promote the fecal discharges, by exciting the peristaltic movement of the bowels, and thus obviates the evils of constipation.

The lack of susceptibility of the upper portion of the canal to the action of purgatives is owing doubtless to the limited supply of bile to the duodenum, while the bilious discharge may be regarded in some sense as an excretion by its admixture with the fecal evacuations; yet it is more properly held to be a secretion in its quality of combining with the alimentary mass and so modifying the ingesta as to fit the materials for nourishing the body. There is no doubt on the part of physiologists of its containing elements that are requisite for completing the digestion and assimilation processes.

The analysis of human bile affords the following results: Specific gravity, 1,022.14. Its ingredients are: Water, 86.42; solids, 17.38; inorganic, 1.388; organic, 9.992; bilirubin, 1.49; cholic acid, 1.819; glycocholate of soda, 2.329. Upon comparing this with the constituents of dog's bile it is found that the organic matter in the latter is about double that of a human subject, and that the quantity of cholic acid is ten times greater than in the bile of man. We may infer that this marked difference results from the more decided carnivorous habits of the canine species, and the greater proportion of inorganic elements in the human bile probably imparts to it a much greater tendency to the formation of concretions.

The knowledge obtained by observation and experiment in regard to the properties of the bile in promoting the proper nutrition of the organism, and in stimulating the peristaltic movements of the intestines, goes to corroborate the

results of clinical experience as to its effects. Any material diminution of the quantity, or any considerable change in its quality from the normal standard, tends to produce derangement and depreciation of the assimilation process, so as to impair the alimentionation of the entire organization.

The interruption of the normal supply of bile may result from a deficient secretion or from arrest of the discharge in any part of its course. It may occur even in the small tubes which convey the bile from the various glandular ramifications of the liver.

We learn from the *Gaz. des Hop.* that M. Laborde sums up the results which have been obtained from physiological experiments in regard to hepatic colic as follows :

“ *First.*—The excretory bile canals are endowed with a power of contraction ; they are consequently able to contract spasmodically on the application of a stimulus, whether this be applied directly or indirectly. The contractility resembles that of unstriped muscular fibre, and the existence of such fibres in the walls of the canals is clearly shown by histology, and is in perfect harmony with the results obtained from experiment.

“ *Second.*—The mucous membrane of these channels is exceedingly sensitive, and this occasionally manifests itself under the influence of more or less intense stimuli by painful symptoms, and by reflex phenomena, shown directly by spasms of the channels themselves.

“ *Third.*—The phenomena are particularly induced by the presence and contact of foreign bodies, such as biliary calculi, whose spontaneous migration is thus rendered more difficult. These changes of place, when they occur, are only accomplished after a longer or shorter period, and they possess the peculiarity that the foreign bodies are always carried toward, and finally into the gall-bladder.

“ *Fourth.*—Anæsthetic and anti-spasmodic medicines are best adapted for the treatment of this morbid state, of which the mechanical conditions can readily be realized by experiment.

“ *Fifth.*—These remedies, more especially morphia, chloroform and hydrate of chloral, act by exercising at one and the same time an anæsthetic and paralyzing influence, which produces a relaxation of the spasmodic contraction, a destruction of the spasmodic canals, and an accumulation of the bile, which acts upon the foreign body by means of a *vis a tergo*, and forces it onwards toward the intestines.

“ *Sixth.*—The combination of morphia with hydrate of chloral or with chloroform, *i. e.*, the simultaneous administration of those remedies, is the most effectual way of obtaining the required results, which are the insensibility of the biliary canals, the prevention of pain, and the favorable influence upon the migration and rapid extrusion of the extraneous substances.”

The secretory function of the liver becomes interrupted in the course of chronic obstruction to the discharge of the bile by a sort of reactionary influence, which arrests more or less the production of this fluid.

It is observed, under such circumstances, that no fresh supply of bile is mixed with the long-standing accumulation of bilious matter in the gall-bladder.

There is, if we may so express it, a suspension of vitality in the hepatic organism, and a torpor of its delicate mechanism, so that it remains, as it were, a quiet looker-on at the troubles which ensue to other parts of its functions. Under such conditions the liver ceases to generate bile, and there is no pain, swelling or indication of the organ which could indicate an inflammatory state. Yet it is not alone this torpor which occurs in connection with retention of the bile, as other and graver complications are frequently present with it. The intimate structure of the entire organ undergoes a very marked change, and yet the size and general configuration of the liver does not always differ materially from what is observed ordinarily in health.

The present inquiry being confined to the atonic condition which results from inaction, and which occurs independent of any idiopathic derangement of the secretory functions, I may ask attention to the analogy afforded by the suspension of action in other organs, and the consequent loss of capacity for the performance of their respective parts in the rôles of the animal economy. Numerous instances of physiological disability will be recalled by those who are familiar with the history of suspended activity, and they serve to illustrate the effect of obstruction of the gall-duct in the case under consideration. The product of hepatic action is not utilized, and the organ ceases to perform its office in secretion of the bile.

This is not the place to enter upon the details of hepatic torpor. My task at present is confined to some points connected with the special train of troubles growing out of temporary or permanent occlusions of the gall-bladder. I have had occasion to make latterly two post-mortem examinations in cases of complete occlusion of the bile duct, the full records of which cannot be now reproduced.

In general terms, it may be stated that one of the patients was a middle-aged man, of most active habits, who had come from the United States to Brazil some ten years previously. He had occasionally been troubled with hepatic derangement prior to his fatal sickness, but there was no serious disorder on these occasions. Being under the care of another physician in the early period of this illness, I found him suffering severely with all the concomitants of biliary obstruction, including absence of bile in the evacuations, with jaundice, itching over the surface, and tenderness over a fixed point a little to the right and below the ensiform cartilage. There was also a peculiar and very persistent pain in his right arm. After being under a course of treatment for some time with little effect, there was a somewhat sudden improvement in all the symptoms, with a change in the character of the evacuations, accompanied with a number of gall-stones. Some of these were of a size that caused me to suspect an ulcerated communication of the gall-bladder with the upper portion of the alimentary canal. There was immediate relief to all of his sufferings, with gradual restoration of the natural bilious aspect of the fecal evacuations, and the slow decline of the icteric hue from the eyes and the general surface. Being comparatively free from trouble, and having gained some strength with the return of appetite, he went back to the country and took charge of the plantation of which he was the superintendent. But he came to me again some weeks

afterwards with aggravations of a most serious nature, and died in a few days. The autopsy revealed ulcerations connecting the gall-bladder with that part of the intestines adjacent to the duodenum, and an opening through the diaphragm into the lungs, with which firm adhesions existed. The ductus choledochus was completely closed, and its walls engrossed and hardened. The collection of disorganized bile and serous exudations, which was doubtless originally confined in the dilated sac of the gall-bladder, had made its way into a cavity formed between the upper surface of the liver and the lower surface of the diaphragm, and extended through the aperture into the pulmonary structure. The patient had expectorated this offensive matter in great abundance, and its flow into the bronchial tubes seemed to be the immediate cause of death.

The other post-mortem examination was in the person of a middle-aged Swedish woman, to whom I had been called on the day previous to the fatal result of her disease. A tumor extending below the line of the umbilicus from beneath the ribs on the right side, and the breadth of my hand, gave indications of fluctuation, and I took a colleague to assist me in determining upon the feasibility of the removal of the fluid by aspiration. But her forces were so much exhausted that we concluded not to precipitate the inevitably fatal result, and she died next morning. The patient had been confined to bed for three months with jaundice, and the surface was still of a dingy yellow or brownish hue. It was found upon the autopsic investigation that the sac forming the tumor was the relaxed and distended gall-bladder, which was filled with a semi-fluid dark brown collection of inspissated bile, in which there existed several concretions of different sizes and offering but little resistance to compression. The entire tract of the ductus choledochus was obliterated with thickening and hardening of the tissues. At what had been the cystic orifice of the canal there was a very considerable dilatation, containing a biliary concretion which was closed in on all sides by a membranous formation, into which an incision was made for its removal.

A third fatal case of biliary obstruction has been recently under observation. Being called in consultation by a medical friend, in whose care the patient had been under treatment for some weeks, he gave me the well-defined history of occlusion of the bile-duct. There was present still a characteristic icteric discoloration of the entire surface, with the yellow tinge of the conjunctiva, and a tremor imparting a sense of fluctuation extended below the ribs in the right hypochondriac and epigastric regions. Unfortunately, no opportunity was afforded for making a post-mortem examination, yet there could be no doubt in regard to the complete occlusion of the gall-duct being the source of trouble in the case, and the cause of death. There occurred during the few last days of my attendance irregular paroxysms resembling those of a malignant fever, doubtless from blood poisoning.

A case of occlusion of the bile-duct, having many points of interest, has been under treatment for several months, and remains in my charge at present. The patient is an American woman, seventy-four years old, who led an active life until within the last twelve months, and had enjoyed a fair measure of health and strength.

When my attention was first called to this case there was general debility, accompanied with icteric discoloration of the surface and eyes, as likewise torpor of the bowels, and deficient coloring matter in the evacuations.

Considering it, then, as a case of jaundice, dependent upon a temporary interruption of the biliary secretion, the following prescription was made: Compound extract of colocynth and blue mass, each $\frac{1}{2}$ drachm; podophyllin, 3 grains; made into twelve pills, of which two were taken night and morning. They acted moderately as a purgative, and were continued for a week without notable sign of change in the discoloration. This was followed by an infusion of gentian with bicarbonate of soda, which was used for two weeks, and yet no material alteration. Finding the strength of my patient less than at the outset, and that a tonic was indicated, I prescribed the following: Muriated tincture of iron, $\frac{1}{2}$ ounce; spirits of turpentine, 2 drachms; tincture of nux vomica, 1 drachm; simple syrup, 2 ounces; of which a teaspoonful was taken every three hours during the day, and it was kept up for some ten days.

At the expiration of this period, observing that there was no improvement in the jaundice, and that the intestinal torpidity continued, she was ordered the following pills: Calomel, aloes, jalap and extract of rhubarb, each 1 grain; podophyllin, $\frac{1}{4}$ grain; of which three were taken every morning. They acted as a cathartic, and after a few days were only given occasionally to secure proper evacuations of the intestinal canal.

At this time it was stated, for the first time, that there was general itching over the surface, though it had been present previously without becoming noticeable. My attention being again directed to the patient, a hard mass about the size of a kidney was discovered in the anterior right lumbar region, and it might have been mistaken for a floating kidney if further examination had not revealed that it was within a sac of an oblong shape, that extended up under the ribs. There was a well-defined unoccupied space between the upper border of this indurated mass and the lower margin of the ribs, and by thrusting the fingers below and drawing upwards, this body could be carried up to the line of the ribs, moving readily within the sac. That portion of the tumor not occupied by this body gave the sensation of a semi-fluid collection, and though the evidence of fluctuation was not very distinct, I was convinced that it was inspissated bile, while the kidney-shaped mass was a concretion from the same. My diagnosis was, therefore, obstruction of the bile-duct, with dilatation of the gall-bladder, containing a considerable quantity of semi-fluid bile and this larger biliary concretion.

Reiterated and careful manipulations confirmed this view of the case, and from the entire absence of the coloring matter of the bile in the fecal evacuations, with the torpidity of the intestinal canal, it was inferred that the occlusion was complete, and that no operative procedure could accomplish a satisfactory result, though the subject manifested a willingness to have the tumor opened and the foreign body removed. Her age likewise militated against the operation, and my measures were addressed to a palliation of the constant acidity and atony of the stomach, with a tonic course to relieve the general debility, which was now a prominent feature of the case.

She was directed to use constantly the mixture of infusion of gentian, 10 ounces; aqueous tincture of rhubarb, 2 ounces; tincture of nux vomica, 1 drachm, and bicarbonate of soda, 1 drachm; the dose being half a wineglass every three hours. After continuing this for some weeks it failed to act as a laxative, and the discomforts of every kind being increased, with a very marked febrile excitement, and acute sensitiveness over the epigastric region, it became necessary to resort to some other means of giving at least temporary relief.

Having observed the reports in regard to the use of olive oil in cases of hepatic colic, with the result of dislodging gall-stones, it was thought that, if it did no good, it could do her no harm to try the experiment of a full dose of the oil. I confess that nothing further was expected from it than its laxative effect in relieving the then existing constipation of the bowels. She took a teacupful of the sweet oil, such as is used for the table, at intervals of three hours, until three were taken, when her stomach refused to accept any more. In the course of the same night she had free evacuations of a dark grumous matter, which continued for twenty-four hours with greater or less intervals. After the first discharges there was very little of the characteristic fecal odor with the evacuation, but a disagreeable smell (which was *sui generis*) accompanied the dejection of the semi-fluid matter that passed, and which had been previously retained within. In the meantime the tumor extending below the ribs on the right side diminished, and the hard mass already described receded upwards to the margin of the ribs. The pain and sensitiveness in the epigastrium ceased, but in the course of a week the darkish discharges disappeared, and eventually there was no further action of the bowels. The patient again became uncomfortable, and the olive oil was repeated with a good result in producing discharges resembling the former matter, but less in quantity, which recurred at intervals subsequently.

Her appetite now returned so that she ate indiscriminately of such vegetables and other articles as she desired without any indications of indigestion, and eventually there seemed to be a restoration of the proper bilious secretion to the evacuations. During this improvement in other respects the itching over the surface was not felt any longer, but there was a very slight diminution of the intensity in the yellowness of the skin and the eyes.

There was no appearance of biliary calculi in the discharges from the bowels, either under the direct influence of the olive oil or subsequently; but there were evidently present in the evacuations the retained secretions and the former contents of the distended gall-bladder.

The channel by which the inspissated bile found its way from its receptacle into the intestinal canal could not have been by any dilatation of the natural outlet, but must have been the result of ulceration, as the circuitous general symptoms indicate, which caused a communication of the gall-bladder with the upper part of the small intestine, adjacent doubtless to the duodenum. This opening, having closed after the first discharges, reopened with the repetition of the oil, and has continued as an outlet for the bile.

The relief afforded in other respects has not been attended with a corresponding change in the icteric hue, and this may perhaps be explained by the fact

that a large mass of biliary concretion remains in the sac, and that more or less accumulation of bile remains along with this body, thus affording the conditions of absorption which keep up the jaundice.

The bile does not escape entirely by the artificial orifice, and, like the overplus of urine in a relaxed state of the bladder, there is perhaps some gradual accumulation in the paralyzed sac which was recently so much distended. I feel no assurance of the ultimate restoration of the normal function of the gall-bladder while so large a mass of biliary concretion remains in its cavity, and though the patient has gone to the country, hoping for a re-establishment of health, I think it most probable that she will fail to realize any permanent benefit.

Still another case has been treated having all the indications of obstruction of the bile-duct with hepatic colic and jaundice.

My attention was first called some two years ago to this gentleman, who is a German by birth, but spent his early manhood in the United States, and has resided in Brazil for the past twelve years. He was then suffering with derangement of the stomach, connected with biliary disorder, and habitually constipated, without proper color in his fecal evacuations. Jaundice was an accompaniment of his other serious troubles, and energetic measures were required for his relief. Yet he subsequently seemed to be re-established in health, until the return of similar disturbance in his hepatic functions at the close of the first year. I was called anew to see him on December 17th, 1880, and prescribed comp. ex. of colocynth, blue mass and podophyllin, in purgative doses daily for four days. But, noting that the torpidity of the liver continued, on the 22nd, I ordered the capsules of spirits of turpentine of Clertau, of which two were taken four times a day. On the 26th of the same month I was summoned to attend him with an aggravation of all the symptoms, and marked increase of the icteric hue of the skin and eyes. Calomel and quinine, each 18 grains, divided into three portions, were given every three hours, and followed by a purge of magnesia and rhubarb on the next day. On the 28th, found my patient writhing with the pain of an hepatic colic, when I gave 12 grains of calomel every two hours until 36 grains were taken, and within two hours after the last he took four tablespoonfuls of castor oil with one of spirits of turpentine. This failing to act upon the bowels, he was given enemata of castor oil with lac assafetida and warm water repeatedly, until evacuations of fecal matter were secured. In the meantime stupes of turpentine and camphor, with flannel wrung out of hot water, had been diligently applied over the abdomen. After the discharges began this was substituted with fomentation by belladonna ointment, and as soon as the biliary secretion made its appearance there was a mitigation of all his sufferings. On the 30th there was some febrile excitement, with considerable tympanic distention of the abdomen, and tenderness over the epigastric region. The Carlsbad salt was given in teaspoonful doses every three hours, and a liniment of spirits of turpentine and camphorated oil was kept constantly over the entire abdominal surface with a flannel roller, giving a moderate support around this part of the body. The acute symptoms being materially modified, on the 1st of January, 1881, he was ordered a mixture, which has proved useful in all relaxations of the alimentary canal in which a

tonic effect generally is desired. This formula, already given for gentian, rhubarb, nux vomica and bicarbonate of soda, was kept up for more than two weeks, with relief to most of his troubles. In the meantime he, being a person of much energy, insisted on looking after his outdoor duties, and was ordered the elegant preparation known as quinium Labarraque, to be taken four times a day in portions of half a wineglass, which was continued from the 16th to the 27th of January, 1881. This was then changed for a decoction of cinchona bark, with sulphuric acid and tincture of nux vomica, during the daytime. As he was restless at night, I prescribed the syrup of chloral of Follet to be taken in tablespoonful doses, with intervals of an hour until three should be taken, at night. But the usual soporific influences of this soothing medicine was not satisfactorily manifested on this occasion, and after a few nights it was discontinued. The jaundice had disappeared; but my patient was annoyed very much with indigestion and irregularity of the bowels, being at times inactive, and on other occasions passing off what seemed to be bilious matter, that assumed a periodic character on every morning before daylight. Accordingly, on the 12th of February the following was prescribed: Sulphate of quinine, 36 grains; camphor, in powder, 12 grains; extract of belladonna, 3 grains; con. of roses, q.s. to make 12 pills, of which two were taken every two hours. This appeared to be attended with some benefit, so that I was encouraged to persist in this course, and adopted one of my favorite tonics February 21st, 1881: Sulphate of quinine, 36 grains; sulphate of iron (pure) 1 drachm; sulphate of strychnine, 1 grain; sulphuric acid (conct.) 1 drachm; distilled water, 1 pint. Mix and take a tablespoonful every three hours. Finding that a periodic febrile paroxysm appeared in the afternoon daily, Fowler's solution of arsenic was added to the above on the 2nd of March, and given constantly for some days.

March 12th, 1881. The patient having little appetite, and the food taken becoming uncomfortable, with acid eructations and occasional vomiting, I used the nitrate of silver with opium, each three grains made into 18 pills, giving one every three hours until six were taken daily. But observing little or no advantage from this course, I resorted to subnitrate of bismuth, prepared chalk, cinnamon water, syrup of opium and mucilage of gum arabic, with better results in allaying the disturbances of the alimentary canal. March 20th, it was perceived that there was a constant acceleration of the pulse, exceeding a hundred to the minute, with nervous irritability, and the infusion of digitalis with bromide of potash was taken for more than a week without relief. April 1st, 1884, as a corroborant and alterative I had recourse to the nitro-muriatic acid, and while the general tone of the digestive apparatus was improved, there was no diminution of the frequency of the pulsation. This patient gave no signs of organic heart disease, and with the continued gastric and intestinal trouble, associated with more or less tenderness over the epigastrium, along with nervous excitability and acceleration of the pulse, dating from the period of the attack of hepatic colic, it is perhaps a legitimate inference that the structural changes initiated then had progressed with ulceration in such form as to account for the whole train of disorders. The rest and quiet of a sea voyage, for it was known in advance that he did not suffer from sea-sickness,

was advised by me as most conducive to a subsidence of any inflammatory process which had existed, and the result has confirmed my anticipations. If the jaundice had been present at the outset, and given way shortly after the return of the bilious matter to the evacuations, it might be supposed that there was an error in diagnosing obstruction of the gall-duct, with abnormal cysto-intestinal communication. It must be concluded by all who are aware of the necessity of bilious matter to the proper performance of the processes of chymification and chylefaction in the upper part of the alimentary canal, that a permanent obliteration of the communication of the gall-bladder with the small intestine is incompatible with health, if not inconsistent with the continuance of life. The prime consideration for the pathologist is whether any considerable collection of fluid ever occurs in the gall-bladder without occlusion of the gall-duct, and the question of paramount importance for the surgeon is the practicability of restoring the flow of bile into the duodenum or the adjacent portion of the intestinal canal by the natural or an artificial communication. A fistulous external discharge may have carried off the vitiated contents of the sac, and thus given temporary relief to the patient; or an operation may be undertaken for the removal of the offending matter, yet the study of this very grave complication is in its infancy, and the heroic measures which are requisite should be regulated with discretion.

With the lights before us it is clear that an effort should be made to overcome the serious difficulties in the way, and if the operation of cholecystotomy is ever to be crowned with a success it should be resorted to while the patient has sufficient strength to rally from the shock of such a procedure, and can outlive the depreciation of all the vital functions which results from the interruption of the supply of bile. That an operation for the removal of foreign bodies from the gall-bladder through an opening in the abdominal wall should have been suggested by Petit, Thudicum, Manndor and Hughlings Jackson amounts to nothing practically, as there is no evidence that any of them put it into execution.

The idea of Handfield Jones, to push the gall-stone into the intestine by manipulation only and without opening the gall-bladder, reminds one of the famous receipt for dressing a hare—first catch the hare. And it would doubtless become equally important in the above cases to discover the said canal, before pushing the hardened mass into it, the duct being closed. In the notice we have of Bartholow's aspiration of the gall-bladder and the subsequent death of the patient, there is no intimation of the state of the bile-duct. Although he has proposed the use of a probe for exploring this canal, and claims that this operation is practicable, no details are given as to the proceeding in any given case.

Brown's report of discovering gall-stones by the probe and after making an incision of two and a half inches without being able to reach the gall-bladder, and closing up the wound seems to be very ineffectual. Yet "in the night bile began to be discharged, the tumor disappeared, and she recovered without a fistula." All will be prompted to ask what became of the biliary calculi that remained behind?—Were they discharged through the duct into the duodenum, and did they make their exit *per vias naturales*?

In the case given recently by Bryant, it is evident that the large biliary calculus was the source of trouble and caused the suppuration. This being removed, and the discharge continuing for some months externally, while the bile duct still performed its office as an internal drainage tube, the external parts gradually healed, and the normal relations soon became established.

Viewing cholecystotomy as an effort to establish a fistulous discharge externally, by which the bile shall be directed from its appropriate channel, and thus prevented from filling the *role* which normally pertains to it, it becomes us to inquire whether there is any guarantee of final and complete recovery, with the interruption of a supply of the bilious secretion to the alimentary canal, as occurs in the proposed diversion.

An interesting account of a case is given by Mr. Frank E. Artaud in the June number of the *New Orleans Medical and Surgical Journal*, 1881, entitled "Acute hepatitis, resulting from the presence of biliary calculi found in the parenchymatous structure of the right lobe of the liver." The author states that "palpation enabled me to deduce conclusively that the right lobe of the liver was by far larger than normally."

Noting the fact that the liver ordinarily does not extend below the margin of the ribs in the right hypochondrium, we should not overlook that, "furthermore, anteriorly an elevation resembling the under surface of an ordinary saucer was present, exceedingly prominent and exceedingly circumscribed, measuring three inches in diameter; its position was as follows, viz.: the upper edge was two inches and a half below the costal cartilage of the seventh rib, whilst the lower bordered upon the right lumbar region." The operator made an incision from left to right transversely, from two to three inches in length just half an inch above the one he had made with the lancet, and four inches from the *linea alba*; also two inches below the costal cartilage of the seventh rib.

The apparent inconsistency of incising a tumor, whose upper border was two and a half inches below the margin of the ribs, within two inches of this line, may be explained by the supposition of a change in the location of the abscess; yet, he had introduced previously an exploring needle in the centre of the elevation, from which was drawn some pus mixed with blood; and this point must have been, according to measurements given, at least four inches below the margin of the ribs. This discrepancy in the statements leads us to conclude that there is an element of doubt in the description of the operation, and that there may be misapprehension as to the nature of the tissues referred to in the following statements: "Having divided the several structures, I found that an adhesion had taken place between the hepatic and parietal peritoneum; I introduced my fingers, and following the path which my instrument had pursued, as a matter of course enlarging it, I at length felt a cluster of calculi firmly imbedded in these cavities, and the contiguous tissues strongly bound down upon them. By means of a probe-pointed bistoury and forceps, I succeeded in extracting fifteen of these calculi in the space of two hours. Their size varied from one-eighth to one-quarter of an inch in diameter, polygonal in shape, of a brownish-yellow color, friable and floating in water."

This operation being on the 22d of December, 1880, he states that on "De

ember 24th I thought it prudent to search for more calculi, and shortly extracted five more, the fifth having larger dimensions than those heretofore extracted. December 26th: Wound once more explored and seven more calculi extracted, alike in size to the others. December 27th: Wound again explored, and no calculi to be found. December 28th: Appetite good, assimilation of food apparently taking place, stool containing a normal quantity of bile." It should have been noted that attention was drawn to the absence of the bilious secretion in the evacuations in the early history of the case. It is notable that during the whole period of observation, before and after the operation, there was not an elevation of a single degree of temperature, nor exelceration in the pulse, and the author calls attention to the fact that jaundice was not connected with the case.

I have no disposition to forstall the judgment of the medical profession in regard to the nature of this case, and the author must allow that a correct impression of his instructive narrative is herein presented. Yet I beg leave to differ with him when he says: "But taking into consideration the symptoms and course of the case, which I have had in close observation, I can safely assume that there was no analogy to those cases in which the gall-bladder has been the seat of disease." Those who have had most experience in the dilatation of the gall-bladder from the contained purulent collection, and have observed the descent of the tumors formed by the distended sac, will detect in the description of the saucer-shaped projection below the ribs on the right side the well-defined characters of such a tumor. I am fully satisfied, likewise, that such extensive suppuration, implicating the glandular structure of the liver, could not be so entirely free from constitutional excitement as was reported in this case.

Surgeons and pathologists, whose attention may be attracted to this case, should note carefully the position of the tumors and the proceedings instituted, so as to form an opinion upon the merits of the diagnosis made. There is a strange omission of any authorized judgment by a competent surgeon in regard to its nature, and with the able staff of medical officers connected with the University of Louisiana and the Charity Hospital, it seems most remarkable that no intimation should be given of the views taken by some one of them. We are only informed that in February, after the patient was relieved of all trouble, "with Prof. Bemiss' consent, the patient was brought before the medical class and lectured upon in the amphitheatre of the Charity Hospital by the above-named gentleman."

The case is in many respects a remarkable one, and not the least so in the subjective phenomena, as absence of the bile in the intestinal discharges and want of the icteric hue of the surface, along with the speedy restoration of bilious matter to the fecal evacuations after the operations had produced their legitimate good effects.

The adhesions between the sinous tissues reported seem to suggest that in cases which are connected with the distension of the gall-bladder, when the tumor is prominent below the border of the ribs on the right side, the operator should first seek to bring about an artificial union of the lining membranes at

the space where the incision is indicated. Thudicum has inculcated the opening of the abdominal wall and securing the sac to the margins of the opening to effect their adhesion, but perhaps the two serous membranes could be stitched together without this opening.

In the July number of the *American Journal of Medical Sciences* for 1881 appears the record of a case having some points of correspondence with that which has just passed under review; yet it differs materially in the concomitants developed as to general symptoms, and in the absence of biliary calculi. It is reported by Walter Mendelsen, M.D., house physician to the New York Hospital, as "a case of abscess of the liver complicated with empyema."

Preliminary to any comment upon the nature and origin of the trouble, attention is asked to the following summary of the points presented: When the woman entered the hospital on October 9th there was enlargement of the liver, and on the 10th it was *supposed* that pus was taken from the right pleural cavity. But I would note a statement that "the upper border of the liver was at the sixth intercostal space," and that "the largest needle, No. 4 of Dieulefoy's aspirator, was inserted twice; first in the eighth and then in the ninth intercostal space," and "each time only a drachm of very thick pus was drawn." I leave the intelligent reader to determine its source.

On October 16th a slight swelling in the right hypochondrium, just above and to the right of the umbilicus, was perceived for the first time, which by the 19th was as large as a goose's egg. On November 2nd the patient expectorated large quantities of purulent material, and on the 5th the tumor in the epigastrium was nearly imperceptible and quite soft to the touch. On the 18th the tumor was noticed to have reappeared, and fluctuation was very evident. At this time "the expectorations had an orange-yellow color, as if tinged with bile," so that it was inferred that the pus in the thoracic cavity communicated with the liver, and the reporter says that "it would be hard to explain the subsidence of the tumor, except by supposing that it had discharged into the pleural cavity."

On November 22d the tumor had increased considerably in size, its growth having taken place mainly to the left of the umbilicus. The patient's breath was horribly offensive, having the same odor as her expectoration. As the abscess showed decided signs of pointing, it was determined to operate. At 9 A.M. the pulse was 112, respiration 36, and temperature 101.8°. The patient being etherized, at 11 A.M. an incision one and a quarter inches in length was made just above, and one inch to the right of the umbilicus, in the softest part of the tumor. After a rather superficial cut the pus was reached and poured out in great quantities, about a pint or more discharging in a few minutes. The pus was thick, viscid, sanious and clotted. It was mixed with portions of bright yellow pus and shreds of broken-down tissue. It was entirely free from odor.

"The cavity was washed out with a solution of carbolic acid (1 to 40 of water), and on introducing a finger through the wound, the abscess was found to consist of two portions: one the main cavity, lying to the right of the median line, and having the size of a very large orange; the other a smaller one about the size of a pigeon's egg, just to the left of the median line; the two being

freely connected by a canal running transversely under the *linea alba*. The liver tissue could be felt projecting into the cavity in hard nodulated masses, covered with a pulpy material which was easily scraped away with the finger. It was impossible to touch the bottom of the abscess with the finger, but a probe could be introduced for about four inches in a direction backwards, upwards and outwards." The reader must divine what is meant in this last word, considering the position of the incision. Referring to the examination of the pus by the pathologist of the hospital, it is stated significantly: "Nothing that could be distinctly identified as liver cells was found."

After the immediate perturbation of the operation had passed, he found at 10.30 P.M., pulse 120, respirations 34, temperature 96.6°.

"Dec. 27.—The lower border of the liver was still at the umbilicus, being bound down by adhesions." It is notable that "at no time during her illness had she been jaundiced."

With a proper appreciation of the data appended by the author, let us hear a few words in regard to the tumor: "On its first appearance various theories relating to its nature were advanced. It seemed in the beginning as though it might be the gall-bladder, for it was in the place where this organ appears when distended, and was soft and globular. Careful exploration, however, revealed the sharp edge of the liver below the tumor, a condition which of course could not exist had it been the gall-bladder. As the edges became more indurated, it was supposed to be an abscess in the abdominal walls, the result of the pus from the empyema making its way downward; for, be it observed here, there was no suspicion of hepatic abscess when the woman was admitted, and all her trouble was referred to her empyema. From the first the hepatic origin of the abscess had been strongly advocated in view of the enlargement of the liver, and the mould-like edge of the tumor, caused probably by the adhesions formed between the liver and the abdominal walls."

The contradictory statements in the above paragraph, that "there was no suspicion of hepatic abscess when the woman was admitted," and "from the first the hepatic origin of the abscess had been strongly advocated," may perhaps be reconciled by supposing that the first referred to the impression prior to any examination. But then, how could it be known that the empyema existed at that time?

The internal evidence of inexactness in the use of terms, not to say confusion of ideas, is patent in many parts of this record. Though my space has not allowed me to follow the report in detail, I have presented the salient points, without any intention to change its purport, and for the most part giving the phraseology of the author.

The experienced reader will doubtless have perceived that all is not quite so clear as it should be in the history of the case, as there is no reference to the fecal evacuations, so that we are uninformed in regard to the presence or the absence of bile in the discharges from the bowels. In view of the avowedly doubtful nature of the case up to a certain period, it might have occurred to the quise physician to make some observation of a matter so essential to determining the implication of the gall-bladder in this suppuration. In an important

surgical case, as this must be regarded by all thinking men, it was much to be desired that the medical profession should have had all the light available for a proper diagnosis. If the veteran Markoe had been consulted, and his opinion reported as to the distinguishing features of the case, it would have enabled medical men to decide upon the merits of many points which are left in obscurity by the off-hand mode in which they are disposed of by the reporters. As for instance, he says, in a matter-of-fact style: "When the tumor was incised, and after evacuating its contents, the finger was introduced into the cavity, of course no more doubt regarding its nature remained."

If the authorized judgment of such a man as Hammond, who has frequently aspirated abscesses of the glandular structure of the liver, could be had upon the origin of the pus in this case, it would not appear quite so plain that it came from the substance of the organ.

For my part, I am compelled to dissent from the foregone conclusion of the author as to the tissues implicated, and unless I could put my finger in that hole, to the bottom of which his could not reach, there must be a doubt as to the correctness of his observations. Autopsic investigation has demonstrated that extensive collections of sero-purulent matter, or of regularly formed pus, are found in the dilated sac of the gall-bladder, occupying the position in which this tumor was found; and, further, that these fluids may traverse the diaphragm by an ulcerative process, or extend around and above the liver, so as to be between it and that muscular partition of the abdominal from the thoracic viscus. The inflammation thus set up induces adhesions between the investing membrane of the lungs and that lining the cavity of the thorax, so an opening may be effected directly into the pulmonary structure, and thence the matter may be expectorated, as in this case.

Any student of the facts presented in those cases reported by Mr. Artaud and Dr. Mendelsen will no doubt discover that one of the essentials of retention of the bile, consisting in the icteric discoloration, has been absent; and it may not have been remembered that obstruction of the ductus choledochus, with a purulent collection in the gall-bladder, should not be attended with jaundice. The presence of bile confined in the sac is a requisite for its absorption and diffusion by the circulation, and if instead of bile there exists pus, jaundice should not occur, as, in fact, it has not been found in either of these cases. Viewed from this standpoint, I am inclined to consider both of these abscesses as proceeding from obstruction of the bile-duct, and hence as included properly under the head of which this paper treats. It is, however, claimed that these tumors did not implicate the proper parenchymatous structure of the organ, but were purulent collections in the gall-bladder, which being discharged afforded relief. In the case of Artaud there was noted a restriction of bilious matter in the evacuations, and, unfortunately, in that of Mendelsen nothing is communicated touching this point, either before or after the operation.

Neither of the cases had been under observation for a sufficient time to determine the final result upon the health of the patients. It is a remarkable coincidence that these two important surgical cases should have been operated upon on the same day of the same year, the 22d of December, 1880, and that they

should have each progressed so favorably as to be dismissed from any special supervision within a week afterwards. Let the seat of either be as it may, the operations were successful.

The three cases described by Morgagni, all of whom had tumors in the epigastrium which were opened either by art or spontaneously, discharging cystic calculi at the aperture, need authentication. If the statement that the first was cured, the second recovered with a fistula, and the third with an ulcer, can be relied on as true, they go very far towards establishing the results obtained in the cases of Bryant, Mendelsen and Artaud, and we may take them as a corroboration of the fact that the suppuration within the gall-bladder, from the presence of gall-stones or without them, is not incompatible with preservation of an outlet by the gall-duct.

It is not improbable that, though a stoppage of the gall-duct may occur temporarily from inflammation of its walls, there may not be adhesion, and with the subsidence of the swelling and turgescence of the tissues by the evacuation of the contents of the sac, the tract of the canal may be restored. The radical procedures instituted by Sims and by Keen for dropsy of the gall-bladder are types of the operation styled cholecystotomy, and their untoward results only hastened the termination of sufferings which were destined ere long to wear out the little remaining strength of the patients.

The extensive collection in the distended gall-bladder removed by the operation of Keen was not connected in any way with biliary concretions, as no gall-stones were present. It is much to be regretted that the post-mortem examination did not reveal the state of the ductus choledochus, as the verification of the closure of the duct must be regarded as of great moment in the history of this class of cases.

In the case reported by Sims a most unexpected revelation is made in the details of the autopsy made by M. Ganai, which leads one to suppose that complete obstruction of the ductus choledochus had not at any time existed in this patient. In the full, and for the most part satisfactory, account of the case operated upon by Sims it is stated, in the observations made after death, that "M. Ganai then passed a director into the gall-bladder, through the external fistulous opening, showing the continuity of the two. After satisfying himself that the operation had been successful in this respect, he cut the gall-bladder loose from the parietes of the abdomen, and then introduced his hand into it and removed sixteen gall-stones, from the size of a pea to that of a pigeon's egg. They were all sacculated, and this was the reason that they were not removed at the time of the operation. He then removed the gall-bladder entire; it was very large, and its walls were much thickened. After doing this he was able to pass a probe from the gall-bladder through the ductus communis choledochus into the duodenum."

It is a serious omission in the statement of such an important point, that nothing should be said in regard to the calibre of this canal and the state of its walls. Should the bile-duct have previously allowed a free communication with the duodenum, it seems quite unaccountable how the twenty-four or twenty-six ounces of dark-brown fluid withdrawn at the time of the operation should have

remained in the cavity of the gall-bladder without escaping into the intestines. If, however, the opening in the canal was so constricted as barely to allow the passage of an exploring probe, it might very well have prevented the escape of a rather consistent fluid from the cavity of this sac. But why was it kept confined earlier, when the fluid must have been thinner and should have escaped at an outlet which admitted the probe. That gall-stones form in the gall-bladder with an open duct for the partial outlet of bile does not prove that any considerable collection of fluid would remain while there existed an opening for it to flow out by the duct.

If this examination and the manipulation with the probe had been made by Dr. Sims in person, I should not have a doubt of its correctness in every point. But when it is stated that M. Ganai, thinking he had cut through the peritonæum, began to separate it from the abdominal parietes, saying, "Here is peritonitis with adhesion everywhere," and that Dr. Sims told him "to open the peritonæum, which he did, and found that there was not the slightest evidence of peritonitis," it leaves us in doubt as to whether his probe might not have been thrust through the softened tissues of an occluded duct.

It will be seen that this matter should be understood in its bearings upon the end contemplated in this operation for relieving the sac by an external fistulous opening.

In a paper by Mr. Lawson Tait, in the *British Medical Journal* of May 8th, 1884, the following remarkable statement is made: "The conclusion of the surgical experience in these cases is, that the entire possibilities of the treatment of gall-stones and distended gall-bladder are exhausted in Dr. Marion Sims' original paper published in this journal, that no further extension of it seems possible, and that no further experimentation such as that of Wells and Langenbach seems desirable." This is passing strange.

While the proposition made by Langenbach for the removal of the gall-bladder is, in the words of Tait, "intrinsically absurd," it is by no means so clear that the proposal made by Sir Spencer Wells "to open the gall-bladder, remove the calculi, and to close it by a continuous suture, without attaching it to the abdominal wound," may not be advantageous if it be followed by a subsequent operation for affording a direct outlet of its contents into the intestinal canal. What he and others have failed to undertake I have now to suggest.

In reporting subsequently the crushing of a gall-stone in the duct with the forceps, Mr. Lawson Tait departs from the masterly inactivity which his previous teaching would inculcate; and we should not be surprised if the return of the normal color to the patient's motions indicated relief to the obstruction, so that his proposed closure of the fistula should be attended with the most salutary results.

The attitude assumed by this distinguished surgeon in the *British Medical Journal* of May 3d differs so entirely from the publication in the same journal of July 12th, 1884, that we look with great interest for the report of his closure of the fistula in this case. And he was so considerate in undertaking to crush the stone *in situ*, by means of padded forceps applied outside of the duct, as to

say that if a better plan should occur to any of his readers he would be glad to hear it; so it is hoped I shall have full credit for my suggestions.

The entrance of the bile into the upper division of the intestinal canal being essential to health, if not to life, is there any assurance, when the bile-duct becomes obliterated, that an artificial communication by catheterization or by puncture can be effected, to convey the contents of the gall-bladder into the alimentary canal? This is a requisite for the favorable issue of any operation looking to an outward discharge of the contents of the sac in dropsy of the gall-bladder, and unless this point can be resolved satisfactorily, surgeons will be under the dire necessity of abandoning the subjects of occlusion of the bile-duct to their sad fatality, rather than become the active instruments of precipitating such a calamity.

The surgical proceeding which is indicated for dropsy of the gall-bladder, as distinguished from the suppuration set up by the presence of gall-stones, or, independent of them, appeals to the discrimination of pathologists, as it is evident from the results of spontaneous and artificial processes in the latter that the prospect of relief in this class of cases is more favorable, than in the degeneration of fluids that characterizes dropsical or sero-purulent collections in the dilated sac of the gall-bladder. The burrowing tendency of these vitiated fluids, when extravasated by local ulceration, so clearly illustrated in my first noted autopsy, by the permeation of different tissues, should afford us a warning against delay in resorting to such operative procedures as may be indicated for the removal of collections in the gall-bladder.

There are serious complications connected with scirrhus of the pylorus, the duodenum and the pancreas, involving to a greater or less extent the bile-duct, which preclude any hope of permanent relief.

I co-operated with two of my colleagues in Brazil, during the past year, in making an autopsy in the case of a man from the United States that had scirrhus of the pyloric orifice of the stomach extending to the duodenum, which caused arrest of the bile from impaction of the ductus choledochus.

In a cadaveric examination of a mulatto woman, on the 31st of August of this year, in Atlanta, Ga., with Drs. J. J. Caldwell and K. C. Divine, the pancreas was found in a scirrhous state, with thickening and induration of the tissues around the course of the bile-duct, it being entirely obliterated throughout its length. The distended gall-bladder contained about half a pint of decomposed semi-fluid matter, which had evidently been locked up for a considerable time.

In these cases no operation succeeds, whether the contents of the sac are fluid, semi-fluid or solid. It is proper under some circumstances to evacuate the distended gall-bladder externally, with a view to establish subsequently a free communication from it to the intestinal canal, which is requisite for a successful result of the operation.

Having made an incision into the peritoneal cavity over the most prominent part of the distention, a digital or an ocular examination may enable the operator to determine upon the propriety of opening the sac, and the process of introducing an exploring needle or trocar without making a cutaneous incision,

with a view to detect gall-stones, being more liable to serious consequences, it is preferable that this plan of incision, with proper precautions, be adopted, so that the exploration and operation which may be indicated may be completed on the same occasion.

If it is found requisite to open the sac, so as to discharge its contents externally, and the serous surfaces are not adherent, a portion of the adjacent wall of the gall-bladder should be hooked up with a tenaculum and secured with a cutaneous suture around the margin of the incision in the abdominal wall. The tissue included in the tenaculum may then be clipped out with scissors, offering thus a ready exit to the contents of the sac, after which the orifice of the duct may be sought with the finger so as to explore the canal entire with a probe. Should any communication with the duodenum exist, however small it may be, dilatation of the ductus choledochus should be attempted. But in the event of occlusion an effort may be made to pass a curved trocar along the obstructed tract, with a view to establish the canal, leaving the sheath until a fistulous communication is effected, with the inner end passing into the intestine, and the outer extremity projecting from the superficial opening.

Should this measure be found impracticable after evacuating the sac, whether it contains gall-stones or fluid matters, the opening in its walls may be detached from the abdominal incision, and yet retained under control by a thread passed with a needle like a drawing-string around the margin. Thus a finger may be introduced and bring the surface of the alimentary canal below the insertion of the duct in contact with a portion of the wall of the sac, so that a needle with an elastic ligature may be passed through the tissues of both, having their adjoining surfaces united closely in the loop which constricts the inclosed walls until they are cut through, so as to leave a communication between the two, such as has been observed in the ulcerated opening of the gall-bladder into the upper portion of the small intestine. As the elastic ligature might divide the tissues without proper adhesion between the surrounding surfaces, a circular stitching should be made by alternately catching the wall of the sac and that of the intestine with a continuous catgut ligature, which would secure adhesion between their surfaces. This could be left for absorption, while the elastic ligature would naturally find its way into the alimentary canal, and the opening externally may be closed up, with the expectation that the bile shall find its way through the artificial connection into its proper channel for intermixture with the contents of the alimentary canal.

Every step should be conducted so that none of the contents of the gall-bladder or the intestinal canal shall escape into the peritoneal cavity, and we should arrest an external fistulous discharge from the gall-bladder by closure of its walls separately from the union of the external incision.

Notwithstanding the uncertainty of demonstrating surgical procedures upon inferior animals, I have undertaken some experiments upon dogs which are calculated to illustrate the practicability of uniting the walls of the gall-bladder and duodenum by an elastic ligature, and encircling this with stitches of catgut, so as to effect adhesion of the surrounding surfaces, when the opening is made by this constriction and cutting of the tissues. I have operated upon five

dogs: on August 9th, 1884, No. 1; on the 11th, Nos. 2 and 3; on the 12th, No. 4, and on the 13th, No. 5. In case No. 3, on the 14th, the stitches being torn loose, perhaps by the tongue or teeth of the dog, the intestines were found upon the ground, and with indications of peritonitis. Being washed and returned, the wound was well closed with interrupted suture, and a broad bandage placed around the body of the animal. On the 15th this case was found to have died during the night, and the post mortem revealed the interesting facts that the elastic ligature had cut through entirely and disappeared in the intestinal canal, while the catgut continuous stitches used to approximate the adjacent surfaces of the gall-bladder and the duodenum had effected a slight adhesion. Upon stitching up the duodenum to the point of the opening it was evident that too much tissue had been included in the ligature, as the orifice was unnecessarily large; and in repeating this experiment I would suggest that the needle and ligature should only include so much of the respective walls as to secure an orifice from the cavity of the gall-bladder into the alimentary canal. While the escape of bile left the sac flaccid, there was no evidence of discharge into the peritonæum, thus showing the efficiency of the mode of proceeding.

The remaining four dogs are still alive, and there is a probability that some of them may survive, so as to afford an opportunity of testing the ligation of the bile-duct and turning the discharge altogether into the artificial opening, of which due notice will be given subsequently.

Taking up the cases in the order of sequence, it may be stated that, after escape of omentum on two consecutive days from the tearing out of stitches, case No. 4 died on the afternoon of August 18th. A post-mortem examination revealed the gall-bladder full of bile, and the unknotted elastic strip was lying loosely upon the external surface of the duodenum, which presented a minute opening into the canal, with some thickening of its walls adjacent to this orifice. Upon a close inspection of the gall-bladder, a small circumscribed portion of its surface was found to be adherent to the under surface of the left lobe of the liver, and the cicatrix of the wound by the ligation was soldered up by this adhesion. As the ligature had broken in the application of it originally upon tying the second knot, I infer that so soon as the tension ceased, by partially cutting through the tissues, it was unknotted by its own elasticity, and as in this case there was no circular stitching, the parts immediately separated, thus failing to present any solution of the single-ligature problem.

The opportunity to verify a favorable result was lost by the escape of case No. 2 on the night of the 18th, which is a matter of regret, as this was the only subject that had no trouble with the external wound, and gave no indications of serious disturbances internally.

On the 20th a puppy of three or four months was operated on, under the influence of ether, by making an incision of two and a half inches and passing a silk ligature through a very small portion of the walls of the gall-bladder and duodenum, by which they were secured in close contact. But the circular stitching together of the serous surfaces around the ligature was not used in this case, and from the fact that bile tinged the discharge from the wound during the afternoon and subsequent morning, I am apprehensive that the silk thread,

though doubled, may have cut out from the gall-bladder. The little animal has been playful since the second day, and eats heartily, so that I may have a chance in this case to test the effect of ligating the gall-duct.

Case No. 1 died August 23d, and although the external incision had not united at some points, the inner peritoneal wound seemed to be completely closed. Upon laying it open considerable discharge of decomposed serum occurred, and upon tearing up the adhesions of the abdominal viscera a large abscess was opened lying at the posterior part of the right lobe of the liver. There were adhesions of the duodenum to the under surface of the liver, so as almost to conceal the site of the gall-bladder, which had undergone considerable degeneration of structure, yet presented the internal and lower wall distinctly. The securely-knotted elastic ligature was found within its cavity near a fistulous opening that communicated with the duodenum, and the specimen is preserved illustrating the adhesion of the exterior surfaces, and the orifice through the agglutinated walls, which have a striking resemblance to a diminutive human mouth, with the mucous membrane of the duodenum reflected over the margin of the gall-bladder.

In case No. 5 death ensued on the 24th, as, notwithstanding all precautions, the wound had been torn open several times, and at last leaving the spleen and a large mass of the small intestine on the ground. There were adhesions of various tissues about the liver, and firm attachment of the duodenum to its under surface and to a portion of the wall of the gall-bladder, while in other parts the sac had undergone disintegration; yet a well-defined opening from the duodenum into the gall-bladder resulted from the action of the elastic ligature. The slit presented the same characteristics as described in case No. 1, yet being a little longer, and the elastic ligature had disappeared in the intestine. The parts illustrating the fistulous communication and the surrounding adhesion are preserved in alcohol, so as to demonstrate the practicability of effecting this in the human subject, and in cases of degeneration and thickening of the walls of the gall-bladder there is less liability to take on destructive inflammation.

The fistulous communication between the cavities of the gall-bladder and the duodenum effected by the action of the elastic ligature, and the adhesion around this opening caused by the continuous circular stitching of the adjacent serous surfaces, proves the correctness of the principle upon which I have proceeded in these experiments. The extension of inflammation to the gall-bladder in such form as to cause disorganization in No. 1 and No. 5 is not satisfactorily accounted for; and there was no evidence of such serious results to the walls of the gall-bladder in case No. 3, in which it was noted that the gall-bladder was entirely empty and flaccid, as the aperture in its wall joined to that of the duodenum gave a direct outlet to the bile, without presenting evidences of intense local inflammation.

The fact is notable that the knotted ligature remained in the gall-bladder in No. 1 while it passed off in the canal in No. 5, depending doubtless upon the inclination of the knot to one or the other wall when tied. As the stitches placed in the incisions of the intestinal canal pass ordinarily into its cavity, it might have been supposed that the same thing would occur in this

union of the gall-bladder with the duodenum, but quite a different principle operates in the two cases. In the case of suturing the incised wall of the abdominal canal alone, coagulable lymph is thrown out exterior to the site of the suture, so that it is protected on the outside and cuts its way into the cavity. But in the junction of the walls between two loops of intestine by a ligature no such process ensues, and in the union of the bile-sac with the duodenum there is a division of the intervening tissues without any chance for such suppurative effusion, so that the ligature is most likely to go in the direction of the knot. It should hence receive special attention in tying the ligature, that the knot be drawn towards the wall of the duodenum, so as to have the ligature carried into the canal after the tissues in its loops are entirely divided.

On the 28th the subject of the experiment for simple ligation of the gall-duct to the duodenum with a silk ligature, being case No. 6 that was operated upon on the 20th inst., was found to be apparently free from all trouble. The external suture having been removed two days previously, and his jacket replaced, the wound was well-nigh closed, excepting at the anterior extremity, where the silk thread used for continuous suture of the internal peritoneal incision came into view. This was caught with the dressing forceps and removed by cutting the knot. Perfect union was effected throughout this line, and no opening could be found for the entrance of the point of the director, so that a puncture was made with the point of the bistoury for this incision.

The exploration revealed union of the gall-bladder and duodenum, with adhesions of the latter to the lower surface of the liver over the line traversed by the cystic gall-duct, so that it was not practicable to ligate it as was intended. Neither could the ductus choledochus be reached, and yet no doubt exists of the exit by opening between the gall-bladder and duodenum, as the small size of gall-bladder indicates that it is kept drained.

Dr. W. S. Elkins, of this city, who has published some experiments on the liver, was with me in this examination of the result, and concurred in the conviction that a communication had been effected. The original operation was made in the presence of Dr. J. A. Gray and Dr. W. G. Owens, so that all the stages of this successful experiment are thus verified by my colleagues.

It should be stated that besides the persons named eleven other medical men have witnessed different steps in the various experiments; and I am under special obligations to Dr. K. C. Divine, who has very kindly co-operated with me in most of the cases.

WITH THE COMPLIMENTS OF
THE AUTHOR.

ERRATA.

- Pamphlet page*
- 2 Page 362, line 17 from top, for "material" read natural.
 - 2 Page 362, line 23 from top, for "destruction" read distention.
 - 2 Page 362, line 22 from bottom, for "of" read or.
 - 4 Page 364, line 13 from bottom, for "destruction" read distention.
 - 6 Page 366, line 12 from bottom, for "tremor" read tumor.
 - 8 Page 368, line 7 from bottom, for "circuitous" read concomitant.
 - 10 Page 370, line 10 from bottom, for "1884" read 1881.
 - 13 Page 373, line 3 from bottom, for "serious" read serous.
 - 18 Page 378, line 21 from top, for "8th" read 3rd.
 - 20 Page 380, line 8 from top, for "cutaneous" read continuous.
 - 20 Page 380, line 8 from bottom, for "arrest" read avert.
 - 21 Page 381, line 11 from top, for "stitching" read slitting.
 - 23 Page 383, line 7 from top, for "suppuration" read subsequent.

Reprinted from "Gaillard's Medical Journal," October, 1884.

GASTON'S OPERATION, as it will hereafter be called, is well described in the article contributed by its originator in this number of the JOURNAL.

Most well-informed physicians have been aware that, from a variety of causes, the duodenal or inferior extremity of the ductus communis choledochus becomes closed, producing a series of pathological phenomena too well known to require description. Dr. J. Marion Sims and others have endeavored, by the operation of cholecystotomy, or the establishment of a fistulous discharge of the bile externally, to correct the evils and remove the danger of a closure of the duodenal end of the common duct; but, as is well known, the operation has been attended with fatal results. But even had it for the time so far succeeded as to secure the establishment of the fistulous discharge desired, all who are familiar with the physiological problems presented must realize that such success would be only apparent or temporary, and not real or absolute; as the outward discharge of the bile would practically so destroy nutrition, or so impair it, as to render death, as a rule, inevitable. Indeed, the fear of such a result must have deterred Hughlings Jackson, Petit, Thudicum, Langenback, Tait and others from performing the operation of cholecystotomy, for they have often discussed its feasibility, and have had abundant opportunity for performing it. Sims, it is well known, really did perform the operation, and with his usual enthusiasm hoped for wonderful results. He did not remember, or apparently did not remember, that had he succeeded in saving the life of his familiar patient, death must have resulted finally from the diversion of the bile from the duodenum, with the consequent subversion of the digestive processes.

It has occurred to Gaston, and only to Gaston, so far as is known, to establish for the bile a fistulous opening, not through the abdominal walls (cholecystotomy) with an external discharge, but through the walls of the sac and the neighboring intestine, the bile being thus delivered in the intestine and not externally. His method of accomplishing this ingenious, great, novel, and original operation is carefully described in his paper, as published in this number of the JOURNAL.

Gaston has succeeded in his effort, and has created and contributed a new, bold, and life-saving operation. He is entitled to honor and distinction, and his countrymen and his brethren everywhere will fervently and cheerfully accord to him all that he so deserves and has so fairly and fully won.

NOTE.—In 34 cholecystotomies nine died soon afterwards. How many died from malnutrition subsequently no one knows.—EDITOR.

