REPORT OF A CASE OF RESECTION OF THE LIVER FOR THE REMOVAL OF A NEOPLASM, WITH A TABLE OF SEVENTY-SIX CASES OF RESECTION OF THE LIVER FOR HEPATIC TUMORS.[1]

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Two years ago I had the honor of reading before this society an account of the removal of an angioma of the liver in March, 1897, by extraperitoneal elastic constriction (*Pennsylvania Medical Journal*, Pittsburg, October, 1897). This was my second operation for a tumor of the liver, the first having been for an adenoma of the bile-ducts, removed in October, 1891 (*Boston Medical and Surgical Journal*, April 28, 1892), by the Paquelin cautery and enucleation by the finger-nail. Both of these cases recovered. The case operated on in 1891 I saw about a year ago, when she was in excellent health. The case of 1897 wrote me, under date of May 10, 1899, that, apart from rheumatism and some general debility, she is in excellent health. No recurrence has occurred in either case, and, in fact, none is to be expected.

I have now the pleasure of reporting a third case of resection of the liver for a tumor far larger than either of the other two, and with a similarly successful issue. The patient has made an excellent recovery.

The history of this third case is as follows:

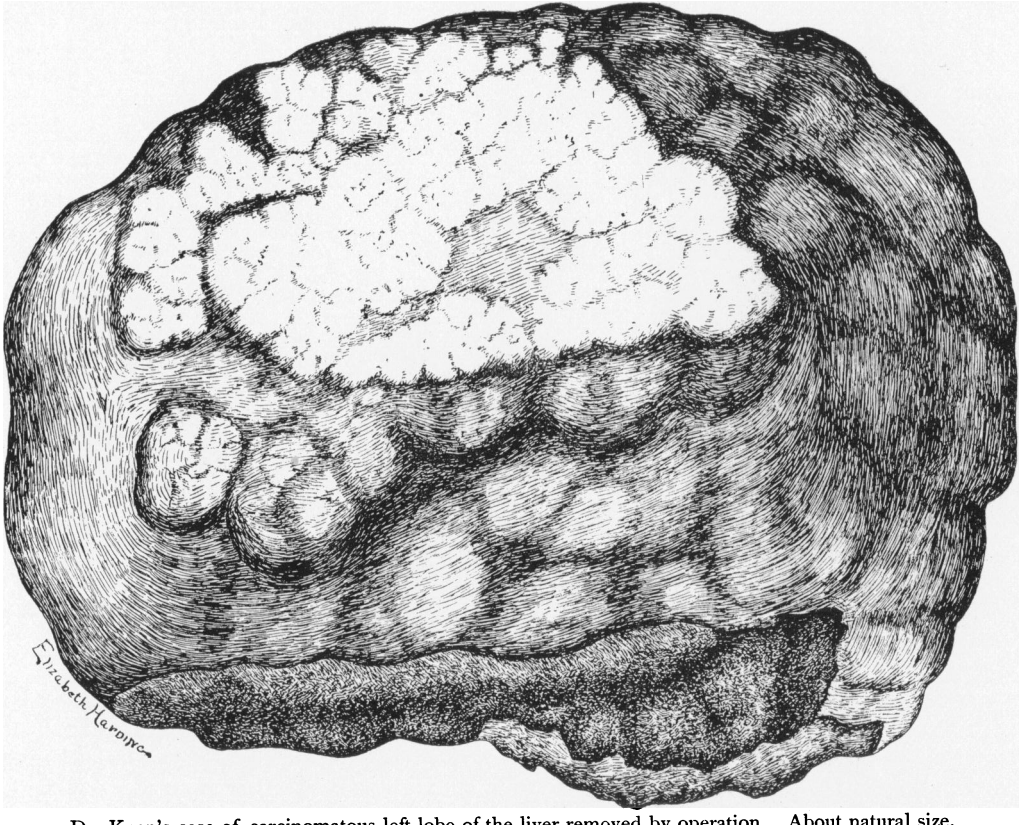
[1] Read before the Pennsylvania State Medical Society at Johnstown, May 17, 1899.

A. F., an Englishman, aged fifty years, white, married, cloth-inspector, entered the Jefferson Medical College Hospital April 18, 1899. His father is living at the age of seventy-four; his mother died at forty-two of unknown trouble. Two of his brothers and sisters died during infancy; four brothers are living and in excellent health. There is no family history of tuberculosis or of malignant disease.

In childhood he suffered from measles and whooping-cough. At eighteen he was confined to his bed for six months with hydrothorax, but made an excellent recovery. He had a light attack of the grippe eight years ago. He admits gonorrhœa, but absolutely denies any syphilitic infection. He uses tobacco moderately, and has been accustomed to drinking three or four glasses of beer a day for the past thirty years. He rarely uses whiskey, and never to excess. He has always had excellent health till three months ago. At that time he weighed 235 pounds. He has a moderately marked lateral nystagmus, which has been hereditary in five generations. His vision is unimpaired.

About the middle of January, 1899, he observed a dull pain in his abdomen just below the umbilicus, but later the pain was felt in the epigastrium. It was only moderately severe, and was transient until six weeks ago, since which time it has been almost constant. It is of a dull, grinding character, and increases after meals. His appetite has been poor for the last two months. At no time has he been nauseated, nor has he ever vomited since his sickness began. The bowels are moved daily, the stools are normal. He has lost thirty pounds in weight, his present weight being 205 pounds. He feels very weak, and has not worked for ten weeks past.

Immediately upon uncovering the abdomen the epigastrium is seen to bulge forward in a uniformly rounded swelling. The elevation above what would be the normal contour of the abdomen is about two to three cubic centimetres. On palpation there is immediately perceived a hard, firm, movable mass, as large as a large hand, entirely filling the epigastric region and extending to the level of the umbilicus. It is dull on percussion, and this dulness is continuous with that of the liver. The examination of the heart and lungs and the abdominal viscera reveals nothing abnormal. The urine is clear, amber, reaction acid, contains neither albumen nor sugar; the urea is 1.9 per cent.



Dr. Keen's case of carcinomatous left lobe of the liver removed by operation. About natural size.

April 19, 1899: At my request Dr. S. Solis-Cohen inserted the gastrodiaphanoscope, which showed an absolutely opaque epigastrium. A test-meal was given, and hydrochloric acid was found in normal proportion. The result of the test-meal, the gastrodiaphanoscope, the physical examination, and absence of vomiting convinced me that the tumor was probably not connected with the stomach. As he had never had any jaundice or other hepatic disturbance and no disturbance with the bowels, I was quite uncertain as to the nature of the trouble. The physical examination, apart from percussion, did not reveal the continuity of the tumor with any of the abdominal viscera until he was etherized, at the time of the operation, when Drs. Spencer and Roe, two of my assistants, felt quite certain that they could determine a physical continuity of the tumor with the liver. I advised an exploratory operation, which he accepted at once.

Operation April 23, 1899. As soon as the abdomen was opened in the middle line it became clear that the tumor was hepatic. On drawing it outside of the abdomen I found a number of large nodules occupying the entire left lobe of the liver. My first impression was that it was a carcinoma, but later, on cutting out a piece for microscopic examination, I rather thought it possibly a gumma or, though less likely, caseous tubercular masses. Passing my hand carefully over the rest of the liver, I found that there were no other nodules that could be discovered, nor was there any involvement of the lymphatic glands. Dr. J. Chalmers Da Costa and Dr. Geo. W. Spencer, who assisted me, reached the same conclusion as to the limitation of the tumor to the left lobe. It seemed to be possible to remove the entire left lobe of the liver and with it the whole of the tumor, and I proceeded at once to its extirpation. The operation was done entirely with the Paquelin cautery. It took from twenty to thirty minutes to sever the left lobe from the remainder of the liver. The hæmorrhage was not very severe, excepting when I burnt into some of the larger veins. Each of these, when opened, I was able instantly to close by my left forefinger. Then, temporarily laying aside the cautery, I passed a catgut ligature under each by means of a Hagedorn needle, and one of my assistants tied it slowly but firmly. Five ligatures were thus applied. Three of the veins required ligature of both of the divided ends. The hæmorrhage, except from these large veins, was arrested by the

Paquelin cautery, except that occasionally, when I laid aside the cautery to apply a ligature, temporary packing with iodoform gauze was of great service in arresting the parenchymatous hæmorrhage. The amount of blood lost I judged to be about eight to ten ounces; but as I feared that there might be a severe loss of blood before I got through, as soon as I began the hepatic portion of the operation Dr. W. J. Roe began an intravenous saline injection, throwing a quart of the solution into the circulation. Of course, the surrounding tissues were well protected against the cautery by wet aseptic gauze pads.

When the tumor was removed, I found that I was able to obliterate a part of the resulting raw surface by folding the edge of the liver upon itself like the flaps of an amputation, as I had made the cautery incision obliquely. A few catgut stitches approximated these flaps, but still there was left over one-half of the burnt surface exposed in the peritoneal cavity. I feared there might be some hæmorrhage or later adhesions, and to prevent both, as well as to provide for the escape of the bile into the peritoneal cavity, I packed some iodoform gauze against the liver, leaving the end protruding through the abdominal wound. The abdominal cavity was then carefully flushed out with salt solution (though but few clots were thus removed), and the abdominal wound was then closed, excepting at the point where the gauze packing protruded.

The tumor measured fourteen centimetres (five and one-half inches) in length; eleven centimetres (four and one-quarter inches) in breadth, and its thickness was seven and one-half centimetres (three inches).[1] Its circumference was twenty-eight by thirty-three and one-half centimetres (eleven by thirteen and one-eighth inches) in the two directions. The raw surface left, where it had been detached from the liver, was thirteen centimetres (five and one-half inches) by six centimetres (two and three-eighths inches). Its weight was one pound and five ounces. Fig. 1 is a drawing of the natural size. A photograph was found to give a less satisfactory idea of its appearance.

The post-operative history is very simple. With the exception of vomiting, which continued for nearly forty-eight hours, and of hiccough on the second day, there was nothing specially

[1] These measurements were made immediately after the operation. Professor Coplin's were made a day later and are slightly less.

noticeable. Ice, champagne, quarter-grain doses of cocaine, and similar doses of carbolic acid, had no effect on the vomiting. At the end of forty-eight hours, after washing out his stomach, both the vomiting and hiccough entirely ceased.

His temperature immediately after the operation fell to 96.8° F., and afterwards fluctuated a little above and below the normal. At the end of forty-eight hours I withdrew the gauze packing. This was stained in streaks with bile. By the fourth day the discharge of bile through the opening left by removal of the gauze was quite free, my estimate being that three to four ounces of bile escaped in the twenty-four hours. This gradually diminished, and ceased by the twelfth day, a little serous discharge then taking its place. This became slightly purulent after two weeks. The wound is now entirely well, except a small shallow sinus which will soon close. The patient is out of bed.

Remarks.—The diagnosis was not clear until after he was etherized, when the physical continuity of the tumor with the liver was fairly well established. Tumor of the stomach was rightly excluded. The nature of the tumor was at first doubtful. But the final conclusion of Professor Coplin, as will be seen by his report, is that it is a carcinoma. Professors Wm. H. Welch and T. M. Prudden, to whom sections were sent, coincided in this view.

Technique of Removal.—From the surgical stand-point this is most interesting. My first case was done partly by the Paquelin cautery and partly by enucleation with the finger-nail, the stump being treated intraperitoneally without drainage; my second was done by extraperitoneal elastic ligature.

When I decided to attack this tumor, the absence of any pedicle and its very broad base (thirteen by six centimetres, or five and one-half by two and three-eighths inches) precluded elastic ligature, a procedure which, in my opinion, is only exceptionally advisable. My experience in my first case emboldened me to use the thermocautery and ligature of the larger vessels, and the excellent result justified my decision. In fact, after my experience with these three cases, I should hardly hesitate to attack almost any hepatic tumor without regard to its size. The adhesions which might be present and

the amount of glandular infection would be much more determining factors as to the operability of any liver neoplasm.

Five vessels, including some hepatic tissue, were tied with catgut. If the ligature is tightened slowly, but firmly, the large hepatic blood-vessels can be treated in the same manner as other blood-vessels. As Kousnetzoff and Pensky (*Revue de Chirurgie*, 1896, pp. 501, 954) and Auvray (*ibid.*, 1897, p. 319) have shown, these vessels are strong, the veins being even stronger than the arteries. All the hæmorrhage from the entire broad surface of attachment was easily controlled by the cautery, aided occasionally by temporary packing with iodoform gauze.[1]

The burning through the liver-substance should be done slowly and with the cautery only heated to a dull red so as to char the tissues. Only in this way is a sufficient eschar formed to arrest the bleeding. I took from twenty to thirty minutes (including the time required for placing the five ligatures) for the amputation in this case. The cautery was repeatedly and slowly drawn across the liver tissue, burning but little of it at each stroke. At points where the hæmorrhage was not quickly arrested, repeated applications of the cautery were required to sear the surface sufficiently. At no time was I anxious as to any particular hæmorrhage, though I confess I was in constant dread lest alarming and possibly uncontrollable hæmorrhage might occur; and I was conscious of a sigh of relief when the last portion of tissue had been cut through and the tumor lay free in my grasp without any notable loss of blood.

A few catgut sutures reduced the large charred surface to some extent, but it was so large that I deemed possible

[1] Much of the iodoform gauze made by commercial firms is a poor hæmostatic. At the Jefferson Hospital and my private hospital I have used with far greater satisfaction gauze made by the following formula, devised by our ingenious clinical orderly at the Jefferson, John Johnson: "Four ounces each, by weight, of iodoform, glycerine, and alcohol, and six grains of corrosive sublimate are well mixed and allowed to stand for three days. Moist bichloride gauze is then saturated with the emulsion, allowed to drip till almost dry, and is then kept in sterilized covered glass jars."

hæmorrhage or later adhesions and certain free discharge of bile good reasons for temporary iodoform gauze packing and drainage. The packing was removed in forty-eight hours. No hæmorrhage occurred, but bile escaped to a considerable extent from the fourth to the twelfth day. In spite of this, if, in any future case, I should have to deal with a *small*, charred surface after removing a hepatic tumor, I shall feel sorely tempted to test the absorbent powers of the peritoneum by immediate closure of the abdominal incision without drainage. If experience shows that no ill results follow, I would then test the method in cases in which the escape of bile would probably be large. Possibly the peritoneum will absorb it all, and if not, a later small incision, or possibly even aspiration alone, might be sufficient to remove any accumulation. At all events, the procedure is worthy of consideration.

Prognosis.—Whether there will be a recurrence in this case, time alone can tell. The absolute limitation of the tumor to the left lobe and the absence of any recognizable lymphatic involvement inspire me with considerable hope. This hope is made stronger by the experience of others. Thus, Hochenegg's case (No. 13 of my prior table) was alive three years after removal of a supposed carcinoma; von Bergmann's (No. 35), after a year; Lücke's (No. 18), a case of carcinoma as large as a fist, was well after three years; and Schrader's case (No. 53) was well as long as seven years after operation. If we may cure 50 per cent. of cases of cancer of the breast and over 50 per cent. of cases of cancer of the rectum and the uterus, why should we not get equally good results at least in those cases of cancer of the liver which are well limited and with little or no lymphatic involvement? Every case, saving those manifestly beyond relief, therefore, should be *explored*, and the later steps be determined by what is found. Exploratory cœliotomy is so safe that the patient should not be denied the possibility of cure. As I have urged in my Cartwright lectures on the "Surgery of the Stomach," *early exploratory cœliotomy* will save not a few lives now lost. All the more is this true now that our resources in dealing with tumors of the

liver enable us to remove those which, a few years ago, would have been deemed inoperable, and our results, both as to immediate and permanent recovery, are so encouraging.

To my first paper (1892) was appended a table of twenty cases of resection of the liver for hepatic tumors, compiled by Dr. Thompson S. Westcott. In 1897, in my second paper, Dr. Geo. W. Spencer's table enlarged the list to fifty-nine. Drs. H. H. Cushing and M. L. Downs have kindly collected for me all the additional cases they could find reported in the literature of the last two years. Without the aid of the library of the College of Physicians of Philadelphia and the generous help so freely extended by the library of the Surgeon-General U.S.A., these tabulations of results in a new field of operative surgery would have been impossible.

I have been not a little embarrassed in deciding what cases should be included and what excluded. Thus, Posadas (*Revue de Chirurgie*, March, 1899, 374) reports twenty-three cases of hepatic hydatid tumors, which were treated by enucleation, suture of the hepatic incision, and immediate closure of the abdominal wound, of which nineteen cases recovered and four died; and three other successful cases, similarly treated, excepting that because of prior suppuration, drainage was required. As none of these required resection or amputation of any of the liver-substance, I have excluded them from my table, though with some hesitation. Three cases treated by marsupialization and drainage I excluded with less doubt.

The case of Jawadynski (*Revue de Chirurgie*, 1898, No. 9, p. 83) I have excluded, as the operation was limited to opening the gall-bladder, the attempt to remove the tumor being abandoned. The case of Knorp (*Pacific Recorder of Medicine and Surgery*, 1899, 207) was excluded, since the operation consisted only of incision of the liver and the removal of eight gall-stones embedded in the liver-substance. So, too, as in White's second case (*British Medical Journal*, 1897, ii, 398), the incision of the cyst and suture of the wound to the abdominal wall, was done; in Bobroff's case (*Archiv für*

klinische Chirurgie, 1898, lvi, 822) only a part of the cyst wall was excised; in Patry's case (*Revue Médicale de la Suisse romande*, 1896, in the *Centralblatt für Chirurgie*, 1897, 1114), a case of hernia of a congenital capsular cyst, the membrane was resected and closed by continuous suture; in O'Conor's cases (*Medical Press and Circular*, 1897, p. 183) only tapping incision and packing were done, I have excluded all, as not involving a true "resection of the liver." Omitting these cases, there remain seventeen cases to be added to the fifty-nine formerly tabulated, making seventy-six in all.

Following the analysis in my former papers, the results of the seventy-six cases are as follows:

(1) *Mortality.*—The termination of Cases 12 and 68 is uncertain. Of the other seventy-four, sixty-three recovered and eleven died,—a mortality of 14.9 per cent. The cause of death in the fatal cases has been shock, hæmorrhage, and exhaustion, eight; septicæmia, two; and pulmonary embolism, one.

(2) *Age.*—The extremes were two and a half days and sixty-seven years. By decades the cases occurred as follows:

Under twenty years of age	5
Twenty-one to thirty	15
Thirty-one to forty	14
Forty-one to fifty	14
Fifty-one to sixty	11
Sixty-one to seventy	3
Total	62

(3) *Sex.*—There were thirteen males and fifty-five females, a great disproportion due, I think, chiefly to the looser clothing worn by men.

(4) *Diagnosis and* (5) *Duration.*—I have nothing of importance to add to what was said in my second paper.

(6) *Varieties.*—

Removal of constricted, accessory, or herniated left lobe	5
Syphiloma	12
Carcinoma	17
Adenoma	7
Sarcoma	5
Angioma	4
Cavernoma	1
Cystoma	1
Angiofibroma	1
Small calculi	1
Endothelioma	1
Echinococcus and hydatid cysts	20
Total	75

(7) *Technique.*—Sufficient has already been said upon this point in the paper itself.

(8) Pathological report of Professor Coplin and Dr. M. B. Tinker:

Specimen.—Tumor of left lobe of liver.

The specimen consists of a tumor of the left lobe of the liver, weighing 525 grammes. It measures thirteen and three-quarters centimetres in length (really the width of the lobe), nine and one-half centimetres in width, and the thickness varies from five to six and one-half centimetres. One part of the margin of the mass presents the rounded contour of the liver lobe, but the edge is much thickened and rounded instead of the normal sharp-edge, except for a distance of two or three centimetres; the rest of the margin is cut square across, and is charred and blackened from the use of the cautery. The surface has the smooth, shining appearance of the normal peritoneum; its color is the reddish color of the liver, mottled by irregular, whitish splotches from two to six centimetres in diameter; these spots mark the location of rounded nodules, which do not rise over one-tenth to one centimetre above the surface. Transverse and longitudinal cuts were made, intersecting near the middle of the tumor. The cut surfaces are almost uniformly of yellowish-white color, looking much like the cut surface of tuberculous glands, but the substance is not the typical caseous matter of tuberculosis. Running irregularly in various directions are bands of fibrous tissue from five to twenty-five millimetres in breadth. The tissue which gives the reddish color of parts of the surface of the liver is only a very thin layer one-fourth to one and one-half centimetres in thickness. The consistency of the tumor does not differ greatly from that of normal liver-substance; if anything, it is softer.

Blocks of tissue of various sizes were hardened in corrosive subli-

mate, dehydrated, infiltrated with paraffin, and sectioned. On account of the extensive caseous changes present in the specimen, the preliminary preparation and sectioning were attended with unusual difficulties. The tissue was extremely friable, falling to pieces even with the most careful fixation to the slide. Sections were stained in carmine, Mayer's carmalum alone, and with picric acid; hæmatoxylin, hæmatoxylin and eosin, hæmatoxylin and picric acid; toluidin blue alone followed by differentiation with Unna's glycerine-ether mixture and with styron, and toluidin blue with eosin; thionin; Unna's polychromatic methylene-blue and differentiated with stryon or glycerine-ether; Unna's alkaline methylene-blue; and for tubercle bacilli with carbol-fuchsin, aniline-oil-gentian-violet solution; Weigert's method for fibrin; and the usual bacterial stains. The best results were obtained with the polychromatic methylene-blue, toluidin blue and eosin, hæmatoxylin and picric acid, and particularly good differentiations in Mayer's carmalum followed by picric acid.

For convenience in description, the sections from different parts of the tumor will be reported upon as follows:

(1) From the periphery of the tumor near the point where it was removed from the adjacent tissue. But very few sections could be obtained from this part of the tumor for two reasons. In the first place, the degenerative changes, caseation, etc., extend suspiciously close to the margin of the growth, and, second, most of the normal liver-tissue adjacent to the tumor has been destroyed by the actual cautery. However, a few sections were obtained which show a small amount of uninvaded liver-tissue adjacent to the tumor. In these sections the liver-cells are intensely bile-pigmented, there is some dilatation of the intralobular vessels, a few areas of cell-necrosis, and a varying amount of lymphoid infiltration. The bile-pigmentation is generally distributed with a fair degree of evenness throughout the lobule. The round-cell infiltrate is, for the most part, restricted to the interlobular connective tissue, although at points the periphery of the lobule may show a few lymphoid cells around the blood-vessels. The intralobular necrotic spots contain cellular detritus, extremely granular, taking an acid dye with intensity, although showing, distributed throughout their structure, a few intensely basophilic granules. The areas of necrosis in the lobule vary in size from involvement of a few liver-cells to areas which occupy nearly or quite half the lobule; a very few are larger. None of the necrotic points examined show the presence of fibrin by Weigert's stain. The margin of the tumor, where it joins the normal liver, is sharply differentiated by a line of fibrous tissue varying in thickness. For the most part this fibrous wall measures between one-tenth and one and one-half millimetres in thickness. While largely made up of fibrous connective tissue, it shows a few unstriped muscular fibres, and a small amount of lymphoid tissue on the tumor-side of the wall. Immediately adjacent to this wall begins the extensive necrotic change which permeates the whole tumor. It would seem that fully 80 per cent. of the tumor mass, if not more, is made up of cellular detritus, caseous, or hyaline material. This extensive necrotic change is almost as marked near the line of separation from the normal liver-tissue

as in the central part of the tumor proper. Along the margins of these irregularly caseous areas, varying in size from twenty to thirty microns to nearly two centimetres in diameter, is found a connective-tissue stroma so arranged as to form irregular alveoli, the walls of which are lined by irregular, atypic, columnar epithelial cells. The majority of these columnar epithelial cells are of the high variety, and have their nuclei placed at the base of the cell, next to the connective-tissue wall. This rule, however, is not constant, as many of the alveoli contain low, columnar epithelial cells with the apex of the cell towards the connective-tissue matrix, and the nucleus at the other end of the cell. In the midst of the necrotic areas will be found small islands made up of similarly arranged elements.

(2) Sections from the central portion of the tumor. Here the change is most marked. The necrotic areas here, as elsewhere, are made up mostly of acidophilic detritus, containing a few intensely basophilic granules irregularly disseminated throughout the structure. Here more than elsewhere we see an irregular growth of the cylindrical epithelial cells with remarkable difference in size, shape, and nuclear characteristics as well as arrangement. Occasionally tubules are found which cannot be differentiated from the tubular arrangement constantly observed in malignant adenoma. The fibrillated connective tissue which forms the stroma contains, in this area, more lymphoid cells than are found near the periphery of the tumor. There are still recognizable a few spindle-cells with long, rod-shaped nuclei, apparently unstriped muscle-cells. The bands of connective tissue not uncommonly extend long distances into the necrotic material, and at points apparently divide the necrotic area into series of alveoli resembling those which in other parts of the tumor contain irregularly formed cylindrical cells, to which reference has already been made. At points in this part of the tumor small areas of hæmorrhage, irregular in size and evidently of different ages, will be recognized. Many of the points of hæmorrhage are evidently old, with extensive, almost complete, fragmentation of the erythrocytes and with an excess of leucocytes in the area involved. Some of the blood-vessels show minute ruptures, and in others the endothelial lining is swollen; an occasional longitudinal section of a blood-vessel will be seen, showing an irregular varicosity. In the tumor-tissue proper we have not been able to demonstrate the presence of any hepatic element unless we consider the irregular tubular structures, occasionally to be detected, residual bile-ducts, or the epithelial cells, the result of proliferative processes in the bile-duct epithelium. Occasionally will be found a necrotic area suggestive, in contour, of a liver-lobule, but similar areas are found which contain the irregular cylindrical cells already described.

(3) Sections from the periphery of the tumor. The hepatic capsule is thickened at nearly all points. In a few areas, immediately beneath the capsule, islands of liver-tissue may be found. These islands of liver-tissue show considerable bile-staining and slight infiltration by fat. The hepatic cells are not uncommonly intensely granular, some of them fragmented, and many scarcely identifiable as liver-cells. Many of the capillaries show swelling, desquamation, and fragmentation of the endothelial lining at

many points. A few show a distinct hyaline strip along the wall apparently just external to an internally displaced intima. The necrotic areas vary in size from a few hepatic cells to five, ten, or fifteen millimetres in diameter, while some areas are considerably larger; here, as elsewhere, they do not take the stain for fibrin. Just under the capsule, at a number of places, are found slightly dilated veins, many of these packed with red blood-cells; some of the vascular plugs are evidently old. The lymphoid cells are particularly abundant in the tissue immediately beneath the capsule, whether such tissue be a remnant of hepatic structure or the marginal zone of the cancerous growth.

A few areas within the tumor show papillomatous-like extensions forcing themselves into the necrotic areas, or it may be they are residual elements which have escaped destruction by the extensive necrotic change which surrounds them.

Irregularly disseminated throughout the tumor and, so far as can be determined, without any connection with its growth, are found a few mast-cells. Plasma-cells are present but not abundant.

Efforts to demonstrate the presence of echinococcus hooklets, coccidia, or other parasitic factor were uniformly unsuccessful.

Bacteriology.—Inoculations were made on blood serum, agar-agar, gelatin, bouillon, and urine agar, with negative results. Attempts to demonstrate the presence of bacteria in the sections were uniformly unsuccessful. Careful search was made for blastomyces and for coccidia, with negative result.

Diagnosis.—On first examination of the tumor and before an opportunity was afforded to examine sections from the adjacent liver-tissue, the small amount of cylindrical-cell element present led us to consider the growth as possibly one of the forms of granulation tumor. After a most careful and detailed study of a large number of sections from all parts of the tumor, we have come to regard it as a cylindrical-cell cancer. The unusually extensive necrotic changes are in our experience quite unique; we have never before observed a cancer showing such an almost universal necrotic process.

The table of seventy-five cases of resection of the liver for tumors was compiled by Drs. H. H. Cushing and M. L. Downs.

[For the first twenty cases, see the *Boston Medical and Surgical Journal*, April 28, 1892. For Cases 21–59, see the *Pennsylvania Medical Journal*, Pittsburg, October, 1897.]

TABLE OF SEVENTY-SIX CASES OF RESECTION OF THE LIVER FOR

For the first twenty cases, see the Boston Medical and Surgical Journal, April 28, 1892.

No.	Reporter and Reference.	Sex.	Age.	Duration, Nature, and Size.
60	Bobroff, Khirurgïa mosk., I., 511-15; in Centralbl. für Chirurgie, 1897, p. 1115.	F.	25	Four months. Echinococcus alveolaris, lower edge of liver. Tumor, 14 cm. in diameter; weight, 200 grms.
61	Ullmann, Wien. med. Wochenschr., 1897, Nos. 47–52.	F.	54	Symptoms 14 days. Carcinoma of gall-bladder, hepatic duct, and neighboring parts of liver. Tumor of liver, 11½ cm. long, 9 cm. wide, and 4 cm. thick. Gall-bladder, 17 cm. long, 9 cm. wide, containing 51 stones.
62	Depage, Gaz. hebd. de Méd. et de Chir., March 13, 1898.	F.	22	Five years. Hydatid cyst in quadrate lobe and three others in left lobe, all size of fist.
63	S. White, Brit. Med. Journ., 1897, II., 398.	M.	17	"Some time." Hydatid cyst, under surface of left lobe. Size of cocoanut.
64	Martin, Birmingham Med. Rev., XLIII., 1898, p. 92.	F.	36	Twelve years. Swelling, size of 6 months' pregnancy. Accessory lobe.
65	Lapointe, Le Bull. Méd., 1897, p. 883.	F.	34	Two tumors, each larger than two fists. Carcinoma.
66	Parker, Lancet, 1899, I., p. 301.	M.	29	About 5 months. Swelling 2 inches wide, below liver dulness. Gumma.
67	Palleroni, Gaz. hebd. de Méd. et de Chir., 1898, p. 805.	F.	55	Tumor noticed about a year. Size of a turkey's egg. Hydatid cyst.
68	Jacomet, Bull. de la Soc. Anatom., 1898, p. 516.	F.	. . .	Four months. About 10 mm. in diameter. Hydatid cyst of liver, having pedicle.

TUMORS. COMPILED BY DRS. H. H. CUSHING AND M. L. DOWNS.

For cases 21–59, see the Pennsylvania Medical Journal, Pittsburg, October, 1897.

Method of Removal.	Treatment of Liver-Stump.	Result.	Remarks.
Excision. Tamponed with iodoform gauze. Floor of excision still of tumor-substance.	Extraperitoneal.	Recovered in 40 days. Later recurrence.	Two previous labors were followed by evident parametritis and swollen inguinal glands on right side.
Ligation and resection of ductus hepaticus and cysticus. Excision of tumor and gall-bladder. After trying ligation, Paquelin's cautery, and pressure, bleeding finally stopped by folding liver on itself in direction opposite to course of blood-vessels and packing.	Extraperitoneal, with drawing up of duodenum for later hepato-duodenostomy.	Partial recovery; after 2 to 3 months; icterus, recurrence, and death.	Three stones wedged in cystic duct. No secondary growths. Daily escape of 400 to 900 grammes of bile for 3 to 4 weeks.
Incision across rectus abdominis. Resection of part of left lobe with Paquelin's cautery. Cyst in quadrate enucleated; packing; drainage-tube.	Intraperitoneal.	Recovered in 15 days.	At first, infection with colon bacillus. Small fistula, which closed later.
Adhesions separated. Cyst excised at base. Closure with 6 deep silk sutures. Hæmorrhage stopped by pressure.	Stump returned to peritoneal cavity.	Recovered in short time.	Cyst dark red, looked like malignant tumor during operation.
Pedicle ligated. Gall-bladder cut away with mass.	Intraperitoneal. Abdominal incision closed with interrupted silkworm gut. No drainage.	Recovery.	Thought to be cyst of kidney. Was accessory lobe. Contained liver-cells but no ducts. Some cells resembling sarcoma.
Pedicle clamped and tumor removed.	Extraperitoneal. Stump fixed in abdominal wall and clamps left on.	Death on 3d day.	Metrorrhagia for about a year led to diagnosis of uterine fibroid. Diagnosis: primary cancer of liver.
A third of gumma was cut away, and the margins of the liver wound sutured.	Intraperitoneal. No drainage.	Recovery.	The partial removal with antisyphilitic treatment caused complete recovery.
Tumor dissected from gall-bladder. A cut made through liver 1 cm. from border of tumor. Silk threads passed through liver to hold it to abdominal wall. The tumor was then cut out from the liver-substance with scissors. Hæmostats and ligatures controlled hæmorrhage. Liver wound sutured and the abdominal wall closed.	Intraperitoneal. No drainage.	Recovery.	Diagnosis lay between floating kidney and hepatic tumor. Walls of cyst about ½ cm. thick and partially calcified.
Pedicle clamped and tumor cut off.	Clamps allowed to remain 48 hours. Abdominal walls closed.	. . . . .	The thick cyst wall prevented fluctuation being felt. As it was attached to the posterior surface, it was difficult to diagnosticate and remove.

TABLE OF SEVENTY-SIX CASES OF RESECTION

No.	Reporter and Reference.	Sex.	Age.	Duration, Nature, and Size.
69	Winiwarter, Rev. de Gyn. et de Chir. abdom., 1897, Vol. I., p. 1088.	F.	50	Six months. No tumor could be felt. Diagnosis: carcinoma of gall-bladder.
70	Müller, Verhandl. d. deutsch. Gesellsch. f. Chir., 1897, XXVI., 137.	F.	"Young"	Appearance during gestation. Angiosarcoma, size of fist, bluish, and covered with dilated vessels.
71	Müller, ibid., p. 139.	F.	. . .	Six years. Cystadenoma (multiple cysts size of pea to fist).
72	Robson, Brit. Med. Journ., 1898, II., 1300.	F.	54	Twelve years. Acute symptoms, 4 months. Epithelioma of gall-bladder, cystic duct, and liver-substance. Gall-stone. Large tumor.
73	Heidenhain, Rev. de Gyn. et de Chir. abdom., 1897, I., p. 1091.	F.	61	About 8 months. Tumor small and irregular in outline. Carcinoma.
74	Monks, Boston Med. and Surg. Journ , April 6, 1899, 329.	F.	36	Only known for 5 weeks. Carcinoma of gall-bladder, involving a portion of the liver and the stomach.
75	Loux, present paper.	M.	31	Hydatid cyst.
76	Keen, present paper.	M.	50	First symptoms only 3 months before operation. Carcinoma. Size, 14 cm. long, 11 cm. broad, 7.5 cm. thick.

OF THE LIVER FOR TUMORS.—*Concluded.*

Method of Removal.	Treatment of Liver-Stump.	Result.	Remarks.
Silk threads introduced at some distance from gall-bladder and tied. Liver-substance incised with thermo-cautery. The bladder, cystic duct, and infiltrated portion of liver removed.	Packed with iodoform gauze and remainder of abdominal incision closed.	Died 6 weeks after.	Cancer; primary in gall-bladder and extended to liver. Calculi were found in the gall-bladder.
Strip of gauze thrust through under tumor, cut, and tied on each side. Then excision. No hæmorrhage. Ligation of vessels.	Extraperitoneal.	Recovery.	After 7 months' involvement of right clavicle. Death 2 months later.
Tumor drawn out. Wedge, size of fist, excised. Many cysts thus opened.	Extraperitoneal, for purpose of operating again.	Died in 11 days.	Death evidently caused by pulmonary embolus.
Tumor drawn out; tourniquet of rubber tube applied under knitting-needles thrust through below involved tissue. Tumor, gall-bladder, and cystic duct excised. Arrest of bleeding by pressure and catgut ligatures.	Extraperitoneal. Needles and superficial tissue sloughed away within a month.	Recovery.	Flow of bile for 10 days after slough separated. Nine months later recurrence and death.
A portion of the liver, 10 to 12 cm. long, removed with gall-bladder. Lembert's sutures were introduced in liver, and incision covered with peritoneum.	Intraperitoneal.	Recovery.	Very little hæmorrhage. Bladder contained one large and many small calculi. Recurrence at end of 3 months.
Presumably with knife; edges united by catgut.	Intraperitoneal.	Recovery.	Partial resection and suture of stomach.
Thermo-cautery.	Intraperitoneal.	Recovery.	Will be fully reported hereafter by Dr. Loux.
Thermo-cautery.	Intraperitoneal. Gauze packing.	Recovery.	Weight of tumor 1 pound and 5 ounces.