

KEEN (W. W.)

REMOVAL OF AN ANGIOMA OF THE LIVER BY
ELASTIC CONSTRICTION EXTERNAL TO THE
ABDOMINAL CAVITY, WITH A TABLE OF 59
CASES OF OPERATION FOR HEPATIC TUMORS.

BY

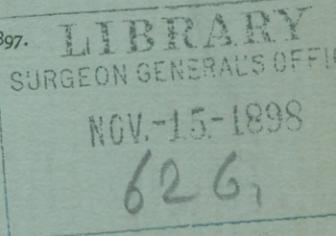
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Professor of the Principles of Surgery and of Clinical Surgery,
Jefferson Medical College, Philadelphia.

Presented by the author

Read at the meeting of the Medical Society of the State of Pennsylvania,
Pittsburg, May 19, 1897.

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PROFESSOR OF THE PRINCIPLES OF SURGERY AND OF CLINICAL SURGERY,
JEFFERSON MEDICAL COLLEGE, PHILADELPHIA.

Mrs. S. B., æt. 53, Higin, Schuylkill co., Pa., was admitted to the Jefferson Hospital, February 19, 1897, at the instance of Dr. Hoffman.

Her mother died of enteric fever at 60; father of apoplexy at 75. Of her brothers and sisters the only noteworthy fact is that of three who died, one died of tuberculosis at 54; four others are living and in good health. As a girl she was delicate. She was married at 23 and has had four children. Her menstruation began at seventeen and was always normal. During the past year it has become irregular, the last period occurring in October, 1896.

For the past five years her health has been failing. In January, 1894, she first noticed a tumor at the pit of the stomach. In July of that year it began to give her severe pain. These attacks of pain have been recurring at intervals of from one to three months, and have pulled down her health very much. They have been attended with nausea, but no vomiting. She has complained also of a burning pain in the right iliac fossa for ten years past; her bowels are very much constipated. Urine, amber color, acid, sp. gr. 1.028, no albumin or sugar, small amount of bile-pigment, sediment

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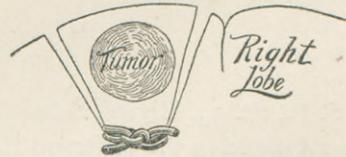
very slight. Microscopic examination negative.

On examination, an elastic tumor is felt to the right of the median line, about midway between the level of the umbilicus and the ensiform cartilage. It is so superficial that on touching it I almost thought it was in the abdominal wall, but a more careful examination showed that it could be pushed under the abdominal wall in every direction, but especially vertically. It was quite tender on pressure. It measured 7.5 cm. in diameter. It was slightly movable in respiration. It was dull on percussion, and two fingers breadth of tympany divided it from the hepatic dullness. A test meal was given and the result showed free hydrochloric acid. By a syringe the stomach was inflated with air through the stomach tube after it had been evacuated of the test meal. The dilatation of the stomach did not alter the position of the tumor, but it was not quite so prominent or well defined. In the left popliteal space, just external to the internal hamstring muscles, is a small tumor.

The diagnosis lay between a tumor of the liver, of the stomach, of the colon, or of the omentum. In spite of the movement with respiration, the tympany between it and the liver, and the impression made by its palpation were against its being connected with the liver. The test meal and inflation of the stomach convinced me that it was not gastric; the absence of any disturbance of the bowels that it was not connected with the colon. I, therefore, rather by exclusion, than otherwise, thought it most likely connected with the omentum, though not excluding absolutely the liver as its origin.

Operation, March 4, 1897. An incision was made from the border of the ribs to the level of the umbilicus in the middle of the right rectus. The liver at once presented. Two fingers introduced into the abdomen showed that there was a tumor at the lower border of the liver, just to the left of the notch where the round ligament was at-

tached. The size of the tumor was 7.5 cm. transversely, and it extended backwards into the liver for a space of about 6.5 cm. The tumor presented on the surface of the liver a rounded bosselated surface. It was elevated above the surface about a half inch. I was quite uncertain as to its character, and, therefore, as Prof. Coplin was present, asked him to look at it with me, and he suggested that it was an angioma. On further examination of the tumor by pressure I became convinced that he was quite right. The veins were nearly as large as my little finger. As it extended upward, evidently encroaching upon the body of the liver, and by the attacks of pain disabled the patient from any household work, and as no other similar tumors were to be seen, I deemed it best to operate. I did not think it wise to attack it with the knife or to attempt to amputate it completely, even by the Paquelin cautery, in view of the very large vessels evidently leading into it, nor did I think it was sufficiently well defined for enucleation. Accordingly, I cut down through the liver tissue into its substance, so as to make a sort of artificial pedicle for the tumor, the pedicle itself being nearly 5 cm. in breadth. (Fig. 1.) Then



Shows how by the cautery the artificial pedicle was formed and constricted by rubber tubing.

I encircled its base with an elastic rubber tube, tying this as tightly as I could draw it. I afterward placed a second one just above it. I then closed the entire wound, packing around the tumor and below the elastic ligatures a collar of iodoform gauze, the tumor itself being drawn outside the belly through the abdominal incision. No pins or sutures were necessary to secure it to the belly wall, as its bulk prevented it falling back into the abdominal cavity. The wound was partly closed at each

end and an ample gauze dressing was then applied. The wound was dressed at intervals of two days. At the end of forty-eight hours the tumor was distinctly shrinking and showed the effect of strangulation. On the sixth day the rubber ligatures were removed, and as there was but a small pedicle left, this was divided by a pair of scissors



Fig. 2. Shows the shrunken and mummified tumor and its pedicle after removal. Natural size.

without the loss of a drop of blood. Fig. 2 shows the tumor shrunken and mummified of the natural size when removed. The constricted pedicle is well seen. The remaining portion of the pedicle slowly sloughed off and became detached at the end of ten days. A small amount of bile escaped from the liver stump. The stump remained adherent to the abdominal wall. The wound contracted slowly. It was skin-grafted by Reverdin's method once. Cicatrization proceeded, becoming complete by the 25th of April (52 days). Her highest temperature after the operation only once reached 100 degrees, on the fourth day after the operation. She suffered almost no pain. Fig. 3, from a photograph, shows the scar.

In the *Boston Medical and Surgical Journal*, for April 28, 1892, I published a case of resection of the liver for an adenoma of the bile ducts and with it a table of twenty cases, compiled by Dr. T. S. Westcott. This first case, after five years and a half, is still entirely well. The present paper contains the only case I have had since 1892, and Dr. George W. Spencer has tabulated thirty-

nine additional cases. At the time of publication of my first paper, my impression was that the case of Langenbuch in 1888 was the first case reported. Dr. Spencer has, however, found an earlier case by Lius, dating back to 1886. This operation was for the removal of a constricted lobe of the liver. In addition to this, Von Hacker (*Wien. med. Woch.*, 1886, Nos. 14 and 15) had already reported one case of constricted lobe of the liver, which was not removed but fixed to the abdominal wall, by Billroth, and Tscherning (*Centralblatt f. Chirurgie*, 1888, No. 23) had operated on a similar case. Both of these recovered and were cured.

The number of cases in my combined tables, it will be observed, is not very large (59), but they are increasing somewhat in frequency, as surgeons become more and more aware of the possibilities of hepatic surgery. From 1886 to 1892—six years—twenty-one cases were operated on; from 1892 to 1897—five years—we have thirty-eight additional cases.

In my former table, two of the cases were

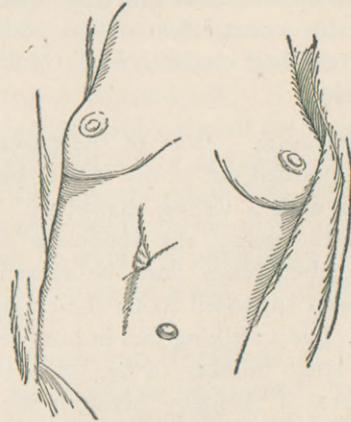


Fig. 3. The resulting scar. From a photograph.

American and 18 European; in my present table seven are American and the others (thirty-two) European. Combining now the two tables together, we find the following facts:

I. *Mortality.* Of the 59 cases reported,

the termination of one (No. 12) is uncertain. Of the other fifty eight, 49 recovered and 9 died, a mortality of 15.5 per cent. Considering the novelty of such operations and the great vascularity of the liver, as well as the fact that the abdomen has to be opened, this is quite a gratifying result. The cause of death of the 9 cases has been shock; hemorrhage, and exhaustion, 7; septicemia, 2.

II. Age. The extremes were 2½ days and 67 years. The baby of 2½ days (No. 50) was operated on for an umbilical hernia of the left lobe. By decades, the cases occurred as follows:

| | |
|--------------------------|----|
| Under twenty..... | 4 |
| Twenty-one to thirty.. | 12 |
| Thirty-one to forty..... | 10 |
| Forty-one to fifty..... | 12 |
| Fifty-one to sixty..... | 8 |
| Sixty-one to seventy... | 2 |
| Total | 48 |

Showing that age seems to have no special influence.

III. Sex. The influence of sex on the contrary is very striking; 42 were women, as against 9 men. That this disproportion is due to the constriction of the chest in women from their clothing is, I think, almost certain.

IV. Diagnosis. Most of the cases reported, as pointed out in my former paper, have been with a wrong diagnosis. The omentum, the ovary, the abdominal wall, the colon, the kidney and the mesentery have all been supposed to be the origin of the tumor. It is a striking fact in both tables that in a large number of the cases there was an area of tympany between the tumor and the hepatic dullness, which, naturally, led to the conclusion that the tumor was not connected with the liver. In both of my own cases the diagnosis was incorrect, one being thought to be a tumor of the kidney the other of the omentum. Similar errors of diagnosis, now that this fact has been pointed out, should be less fre-

quent; especially should the suspicion of the hepatic origin of the tumor be entertained if the tumor rises and falls with the respiratory movements of the diaphragm.

V. Duration. The long duration of the tumor, even in some of the malignant cases, is striking. In 14 cases it is placed statistically at less than a year. After that, in the non-malignant cases, a number of them existed for several years, one (No. 48), an adenoma, for twenty years, which then became cancerous, presumably after an accident. Another (No. 34), a cystoma, existed for fifteen years. A third (No. 32), a carcinoma, was said to have existed for ten years; eighteen years earlier a cancerous cervix uteri had been operated upon. The autopsy eighteen years later showed the uterus free from disease, but the liver and right kidney were involved in the cancer. Another case of carcinoma (No. 25) had existed for several years.

Even more surprising is the survival of the patients a long time after operation, even for what was believed to be a cancerous growth.

Eiselsberg (*Wien. klin. Woch.* 1893, p. 2) states that Hochenegg's case (No. 13 of former table) was alive three years after the operation. V. Bergmann's case (No. 35) was well after a year, and Lücke's case (No. 18 of the former table), a case of carcinoma as large as a fist, was well two years after operation (*Centralblatt f. Chirurgie*, 1892, p. 844). Schrader's case (No. 53), a carcinoma, was well seven years later. Such clinical results should encourage us certainly to radical interference even in malignant growths. Wölfler's recent report of the excellent final results after enterectomy for cancer give us exactly the same encouragement. He has shown that four cases of resection of the intestine for malignant growths have survived from 6 to 19 years (*Annals of Surgery*, May, 1897, 646).

VI. Varieties. The following various forms of tumor are mentioned:

| | |
|--|----|
| Removal of constricted or herniated left lobe..... | 4 |
| Syphiloma..... | 11 |
| Carcinoma..... | 10 |
| Adenoma..... | 6 |
| Sarcoma..... | 4 |
| Angioma..... | 4 |
| Caveroma..... | 1 |
| Cystoma..... | 1 |
| Angio-fibroma..... | 1 |
| Small calculi..... | 1 |
| Endothelioma..... | 1 |
| Echinococcus and hydatid cysts..... | 14 |
| Total..... | 58 |

Perhaps the only striking fact in connection with the varieties of tumor is that there are so many.

VII. Size and number. The size varied from very small ones up to those of the size of an adult head.

Only single and primary growths should be attacked. When malignant disease is secondary or exists as multiple tumors it should be let alone.

VIII. Technique of removal. One of the most important and certainly one of the most encouraging points is the improvement in the technique. Until ten years ago the liver was not deemed amenable to surgical attack on account of its vascularity. This is still the one great danger as is shown in the history of almost all the cases, and in the fact that six of the eight deaths are attributable to shock, hemorrhage and exhaustion. The small mortality shows that this is not by any means an unsurmountable danger. The danger of hemorrhage, even after small punctures, is such that on no account should the liver be punctured, except after coeliotomy, so that if hemorrhage occurs it can be effectually dealt with. The cases of fatal hemorrhage after aspiration, reported by Ricard and Broca (*Rev. de Chir.*, March, 1897, 250), should warn us against similar misfortunes.

Four methods of checking hemorrhage have been employed. First, the ligature; second, packing with gauze wet with hot water; third, the cautery; fourth, the elastic ligature. Not uncommonly, and very wisely, two or more of these various meth-

ods have been employed, so that it is impossible to draw any conclusions from a tabulation showing the relative frequency with which each method has been used.

(1) The Ligature. Kousnetzoff and Pensky (*Rev. de Chir.*, 1896, pp. 501 and 954) have considered the methods quite exhaustively both from the clinical and the experimental point of view. They have shown unquestionably that the individual vessels of the liver can be successfully ligated and that their walls are sufficiently strong to sustain a weight running from 290 grams to 1,600 grams (p. 966) in most cases without rupture. It is rather surprising to see that the isolated hepatic veins are on the whole stronger than the isolated arteries. A later article by Auvray in the same journal (1897, p. 319) confirms the result of these authors. In my first case, I was able, though using the Paquelin cautery, to tie several large vessels before severing them. This was also Elliot's experience (No. 54). When the vessels are tied, these authors have pointed out the importance of tying the knot firmly, *but slowly*. If drawn quickly, the ligature will cut through the hepatic tissue; if drawn slowly it will not. Possibly a flat ligature, such as kangaroo tendon or floss silk will answer better than the narrower twisted or braided silk. Sometimes by a continuous double thread the liver has thus been tied by a row of ligatures. In doing this, the authors referred to have suggested, and it seems to me wisely, that a blunt needle be employed instead of a sharp pointed one, so as to avoid perforation of any vessels.

(2) Gauze and Hot Water. This method will be of service occasionally, but on the whole is inferior to the other methods.

(3) The Paquelin Cautery. This is one of the most valuable means, and I would draw attention especially to the method of its employment in the case I have reported in this paper, namely: by cutting obliquely into the liver substance in such a manner as to make an artificial pedicle. It should

be employed at the lowest heat which will cut the liver substance, a dull red, and by repeated applications will control almost any hemorrhage. In many, if not in most cases not suited to enucleation, the tumor may be entirely removed by this means with little or no hemorrhage.

(4) The Elastic Ligature. This method has been employed by Terrillon (No. 19), Küster (No. 27), Schmidt (No. 36), Czerny (No. 23), Israel (No. 38), Tricomi (No. 40), Mayo Robson (No. 47), Rosenthal (No. 55), D'Urso (No. 56), Watson (No. 57), and myself (No. 59). It proved most reliable in all these cases. It is to be noted, however, that Küster's case died from septicemia. That this had its origin in the gangrene produced by the elastic ligature there can be little doubt. Its use may be, therefore, somewhat questionable, but in a case like my own, it was hardly avoidable. I think that the danger from primary hemorrhage by any other method would have been greater than the danger from possible infection. The collar of iodoform gauze was a valuable means of preventing infection of the peritoneum. Küster's method of passing the ligature was ingenious. A canula was first passed, and through this two elastic ligatures were introduced through the substance of the liver. In some cases the constricted tumor was removed immediately. In others it was secured to the abdominal wall by pins or sutures, or, as in my own case, simply held in place by the partial closure of the abdominal wound above and below the tumor. The utmost care was used to have the pedicle, the tube and the dressing aseptic. If this is done, and the iodoform collar used, I do not think that the danger of elastic constriction, and allowing the tumor to remain for several days till adhesions between the stump and the abdominal wall have taken place, is at all great. The absolute avoidance of hemorrhage is of the utmost importance.

In two cases (Nos. 44 and 50) the gall bladder was removed along with the tumor.

In all cases in which it is possible to treat the stump by the intra-peritoneal method, this should be done. It was the method adopted in my first case, and I believe is by far the best; but where there is danger of recurrent hemorrhage, or where an elastic ligature is used, it is, of course, impossible to treat the stump intra-peritoneally. If treated intra-peritoneally, the stump, if possible, should be constructed in the form of flaps, as in my first case, and the flaps sutured together as after an amputation. If not so treated, the stump should be seared with the Paquelin cautery, as was done by Elliot, and the stump walled off by gauze. The peritoneum will care for and absorb the aseptic slough caused by the cautery.

When the tumor has sloughed off in the cases in which the elastic ligature has been used, the pedicle heals very slowly. In my own case it required six weeks before the wound was entirely cicatrized, and even then with the assistance of small skin grafts. The same expedient of skin grafting was adopted by Czerny (No. 23) and Schmidt (No. 36).

Occasionally the operation will be best done in two stages, but where possible this should be avoided.

The conclusions that I have reached are as follows:

First. Experiments upon animals and operations on man have shown that tumors of the liver and even large portions of the liver can be removed without undue disturbance of its function. Experimental evidence in animals and clinical evidence in man go to show that the liver tissue is regenerated and the loss made good (Ponfick).

Secondly. That the escape of bile into the peritoneal cavity is not usual after such an operation, that by searing the raw surface, by ligation, by walling off with gauze, and by securing the stump in the abdominal wall, it is prevented, and even if it occurs, fresh bile is not infective, and, therefore, does not produce peritonitis.

Thirdly. The two dangers of hepatic operations are sepsis and hemorrhage, especially the latter. The former can be prevented by modern antiseptic methods; the latter can be mastered by ligation, by the cautery, by the elastic ligature or by pressure, or still better, by a combination of these means.

Fourthly. The removal of a tumor can be done by ligation, by blunt dissection, by the cautery, or by the knife or scissors, or by a combination of these methods. If the base is very large or the tumor very vascular, an artificial pedicle can be made by the cautery and an elastic ligature applied.

Fifthly. In case a syphilitic tumor is suspected, no operation should be done until after a full trial of anti-syphilitic treatment has been made and failed. The case of Ahlenstiel (*Archiv klin. Chir.*, 211, 902),

in which an abdominal section revealed the syphilitic nature of the large tumor, is most instructive. The operation was at once terminated; the abdomen was closed and the patient entirely recovered under suitable treatment.

Sixthly. In all cases of doubt, and after a fair trial of anti-syphilitic treatment, provided time allows, an exploratory coeliotomy should be done. If the case is unsuitable for operation, because it is syphilitic or by reason of its size, adhesions, multiplicity of tumors, or for any other similar reason, the abdomen is simply closed and very rarely will any mischief be done.

On the other hand, if, as will very frequently be the fact, the case proves to be operable, suitable surgical measures can be immediately instituted.

Table of 59 Cases of Resection of the Liver for Tumors, compiled by Dr. G. W. Spencer Demonstrator of Surgery, Jefferson Medical College. *

| NO. | REPORTER AND REFERENCE. | SEX. | AGE. | DURATION, NATURE AND SIZE. | METHOD OF REMOVAL. | TREATMENT OF LIVER STUMP. | RESULT. | REMARKS. |
|-----|---|------|------|--|---|--|--|---|
| 21 | Lius. Revue de Chirurgie, 1896, No. 12, p. 977. | F. | 67 | Six months. Constricted lobe of liver. Size of a man's head. | Ecraseur and cautery. | Attempted to stitch stump to abdominal wall but sutures tore out, so liver, no longer bleeding, was returned into abdomen. | D. Six hours after operation from hemorrhage. | Part removed was similar to normal liver tissue. |
| 22 | Koenig. Revue de Chirurgie, 1896, No. 12, p. 986. Lehrbuch d. Specieilen Chirurgie, 1889, II. 223. | F. | 11 | Six months. Cystic adenoma of bile ducts. | | Liver wound closed by sutures of hepatic peritoneum. | R. | Three liters of fluid evacuated. |
| 23 | Czerny. Wratsch, 1890, No. 27. | | | Large syphiloma of the right lobe. | Tumor was brought out of the abdominal wound, constricted with an elastic ligature and excised with bistoury. Veins and arteries were tied. | The stump was cleaned and thermo-cauterized. Edges of liver sutured to the edges of the external wound. 12 days after operation the stump was skin grafted. | R. | The hemorrhage was not severe. |
| 24 | Albert. Wien. klin. Wochenshr., 1890, No. 52. | | | Syphiloma of the right lobe, 8 cm. in diameter. | Opened a layer of normal liver tissue with the cautery. Extirpated with blunt instruments. | Bleeding cavity packed with iodoform gauze. The gauze was applied in rolls to the edges of the wound and held in place by means of sutures. The capsule was sutured over the tampon. Edges of the liver fixed to external wound by a steel needle. | R. | After the operation the patient was free from pain. |
| 25 | Jacobs. Revue de Chirurgie, 1896, No. 12, p. 992. Arch. de Tocol. et de Gynec. de Bruxelles, 1891, No. 10, p. 742. | F. | 50 | Several years. Size of orange. Cancer of the liver. | Section by the thermo-cautery and drain. | | R. | Diagnosis: Fibroma of abdominal wall. Recurrence in seven months. |

*For the first 20 cases, see the Boston Medical and Surgical Journal, April 28th, 1892.

| NO. | REPORTER AND REFERENCE. | SEX. | AGE. | DURATION, NATURE AND SIZE. | METHOD OF REMOVAL. | TREATMENT OF LIVER STUMP. | RESULT. | REMARKS. |
|-----|---|------|------|--|---|---|---|--|
| 26 | Mueller. Revue de Chirurgie, 1896, No. 12, p. 985. XXI. Kongress der Deutschen Chirurgen, 1892. | F. | | Three years. Tumor composed of dilated biliary vessels. | Tumor was brought out of abdominal wound. Pedicle ligated. | | R. | Diagnosis: Cyst of the ovary. |
| 27 | Kuester. Revue de Chirurgie, 1896, No. 12, p. 986, XXII. Kongress der Deutschen Chirurgen, 1892, I. 12. | | | Carcinoma of the liver, beginning in the gall bladder. | Two elastic ligatures passed through a cannula and tied, leaving tumor outside abdominal wall. | | D. From septicæmia. | |
| 28 | Schmidt, F. ditto, I. 9. | F. | 60 | Adenoma. | Cavity curetted with a sharp spoon and packed. | | R. | |
| 29 | Bardeleben. ditto, I. 10. | M. | | Sarcoma of the liver, size of child's fist. | Sutures passed around it, but did not hold. Cavity then packed. Chiefly blunt dissection. | | R. | Well after two years. |
| 30 | Doyen, Revue de Chirurgie, No. 12, 1896, p. 980, Archives Provinciales de Chir., Paris, 1892, No. 2, p. 149. | F. | 23 | Several months. Size of child's head on the left hepatic lobe. | Ligated pedicle. An attempt was made to remove the tumor with the cautery, but this caused profuse hemorrhage. | Stump was returned to the abdominal cavity. | R. | Diagnosis: Ovarian cyst. Liver in a condition of fibrous degeneration. |
| 31 | Martin (c). Bringham Med. Rev., 1892 XXXII., p. 292 | F. | 21 | Six months. Cystic. The tumor bulged out between the lower ribs and the iliac crest. | Liver substance was incised to a depth of about half an inch. The cyst was tapped and enucleated. A huge raw bleeding cavity was left. | The margins of the liver incision were stitched to the margins of the abdominal incision. The hemorrhage from the stump was checked by a firm abdominal compress, which was applied in such a way that the walls of the hepatic cavity were pressed against each other. | R. One month after operation. | At the time of the operation the wound was drained with a glass tube, which was removed on the sixth day and replaced on the ninth day by a rubber tube. This tube was removed on the thirteenth day, and by the nineteenth day the temperature had risen to 104°. A rubber tube was reintroduced and a large quantity of pus evacuated. |
| 32 | Ludlam. Clinique, Chicago, 1892. XIII, 39. | F. | 51 | Duration ten years. Cancerous growth of the right lobe. Size of the adult head. | Excised. Hemorrhage checked by forceps. No large vessels exposed. | | D. Fifteen hours after operation from shock. | Eighteen years before this operation, the cervix uteri was amputated for a cancerous growth. Autopsy: Whole liver involved in the cancerous infiltration. Uterus was normal. Right kidney was involved. |
| 33 | Hanks. Am. J. Obs., 1892, XXV., p. 229. | F. | | Angioma of the lower lobe, which extended three inches beyond the median line. | Punctured the tumor. Closed abdomen and treated the patient by galvanism. | | R. | The tumor decreased two-thirds in size. Once used galvanopuncture. Tumor decreased two-thirds. |
| 34 | Eiselsberg. Revue de Chirurgie, 1896, p. 510, Wien. klin. Wochenschr., 1893, No. 1. | F. | 59 | Duration fifteen years. 470 grammes. Cavernoma right lobe, size of 2 fists. | By blunt dissection at first, then on account of hemorrhage, the excision was done with the cautery through sound liver tissue; stitched capsule. | Liver wound was packed with iodoform gauze held by the threads. The gauze was then brought out through the abdominal wound. | R. In 7 weeks. | |

| NO. | REPORTER AND REFERENCE. | SEX. | AGE. | DURATION, NATURE AND SIZE. | METHOD OF REMOVAL. | TREATMENT OF LIVER STUMP. | RESULT. | REMARKS. |
|-----|--|------|------|--|---|--|---|--|
| 35 | Bergmann. Arch. f. klin. Chirurg., 1893, Bd. XLVI., p. 400. | M. | 61 | Adenoma. 12 cm. broad, 2 cm. thick. | Tumor was brought out the abdominal wound and excised. Hemorrhage was treated by placing deep sutures in the wound, these sutures cut through. Vessels were ligated. Cautery was used. Wound was packed with iodoform gauze, and gauze was brought out lower end of abdominal incision. | Stump was returned into the abdominal cavity. | R. In 6 weeks. | Diagnosis of echinococcus. |
| 36 | Schmidt, G. B. Deutsche medicin. Wochenschr., 1893, No. 19, p. 175. | F. | 37 | Syphiloma, 8 cm. long, 6 cm. broad, $4\frac{1}{2}$ cm. thick. Under the lobulus quadratus. | Elastic ligature was applied around the base of the tumor. Tumor was removed by knife. Four arteries and six veins were caught by forceps and ligated. | Edges of liver cavity secured in abdominal incision. 12 days after the operation the wound was skin grafted by the Thiersch method. | R. One month after operation. | The diagnosis was between a tubercular ulcerated tumor of the transverse colon and a carcinoma. |
| 37 | Rosenthal (J). Centralblatt fuer Chirurgie XXI. 1894, 237. | F. | 41 | Angio fibroma. Size of child's head situated in the lobus Spiegelii. | Tumor was brought out of the abdominal incision and supported by a steel rod. Elastic ligature on base. Excised. | Five days after the tumor was removed the elastic ligature began to cut through the pedicle. This was then divided with a cautery and the cavity was packed with iodoform gauze. | R. In 6 weeks. | Many adhesions. Not much hemorrhage. |
| 38 | Israel. Revue de Chirurgie, 1896, No. VII., p. 512, ditto, No. XII., p. 990, Centralblatt fuer Chirurgie, 1894, No. XXX., 714. | F. | 15 | Sarcoma on free edge of right lobe. Base 15 cm. in diameter. Weight 1225 grammes. | Elastic ligature around base. Thermo-cautery. | Stump returned to abdominal cavity, covered with iodoform gauze which was brought out at the lower angle of the skin incision. | R. But patient died 4 months later from metastasis. (sarcoma.) | Diagnosis: Renal tumor. |
| 39 | Jones (R.) London Lancet, 1894, I, 860. | F. | 21 | Six months. Hydatid cyst, contained 124 ounces. | Cyst incised. Portion of the cyst wall excised. Cavity drained. | Sides of the cyst-wall stitched to the abdominal incision. | R. Four months after operation. | For four months the cyst-wall came away through the abdominal wound. |
| 40 | Tricomi (Padua), Centralblatt fuer Chirurgie, 1894, No. 21, p. 936. | M. | 27 | One year. Adenoma of bile ducts. 19 cm. long, 14 cm. thick, circumference at the base 49 cm. | Elastic ligature was placed around the entire left lobe. Tumor was brought out of the abdominal wound and fastened by sutures. Ligamentous connections were divided. On the fourteenth day the elastic ligature tore. A metal wire was placed around the tumor and the cautery was tried; but on account of hemorrhage this was given up. Three days later isolated one-half and amputated it with a chain suture, and the next day removed the rest. Weight, one kilogram. | Stump sutured to the abdominal wall. | R. In 10 weeks. | Diagnosis of liver tumor before the operation was performed. Sublimated injection and potassium iodide were used. The operator does not think the growing of the tumor to the belly wall will hurt the patient. He recommends the operation in two stages for similar cases. |

| NO. | REPORTER AND REFERENCE. | SEX. | AGE. | DURATION, NATURE AND SIZE. | METHOD OF REMOVAL. | TREATMENT OF LIVER STUMP. | RESULT. | REMARKS. |
|-----|--|---------|------------|---|---|---|--|--|
| 41 | Ditto. | | | Echinococcus. | | | R. | |
| 42 | Ditto. | | | Syphiloma. | | | D. Twenty-four hours from shock. | |
| 43 | Morgan, J. London Lancet, 1895, I., 344. | F. | 38 | Four years. Hydatid cysts. Enough small cysts to fill a pint bowl. | Cyst wall was teased away with forceps. A portion of the wall was excised with scissors exposing a bleeding surface. | Hemorrhage was stopped by ligatures and hot sponges. | R. In 3 weeks. | The diagnosis was malignant tumor. |
| 44 | Bastianelli. Brit. Med. J. Epit., 1895, I., 69. (Il. Policlino, April, 1895.) | F. | 37 | Nine months. Gumma. 500 grammes. | Tumor was removed together with the gall bladder. | | R. | Diagnosis: Displaced cancerous kidney. |
| 45 | Dennis. Syst. Surg., Phila., 1896. IV., p. 550-555. | F. | | Spherical gumma, one inch in diameter, near edge of the liver. | Excised a wide V-shaped piece of the liver, including the gumma. Before the growth was removed it was surrounded by a series of chain stitches of silk. | The stump was returned with its large notch enclosed. | R. | Diagnosis of hepatic abscess. Iodides and mercury after operation. |
| 46 | Abbe, R. Med. Rec., 1896, XLIX., p. 205. | F. | 40 | Multiple gummata, varying in size from a bean to a walnut. | Excised a wedge-shaped piece of the liver tissue one inch by one inch and a half. This piece included one of the gummata. | | R. | Diagnosis of hepatic abscess Iodides and mercury after operation. |
| 47 | Mayo Robson. Brit. Med. J., 1896, I., 658. | F. | 54 | Epithelioma. Weighed one-half pound. | Encircled the growth with an elastic ligature. Brought the tumor out of the abdominal incision and transfixed it with needles. Removed it by cutting through the liver tissue half an inch from the growth. | The pedicle was as thick as the wrist. After separation of the slough a granulating surface was exposed. | R. In 6 weeks. | |
| 48 | Goube, Revue de Chirurgie, 1896, p. 513. | M. | 55 | Twenty years. Adenoma in the left lobe. Cavity left was the size of a child's head. | Incised capsule of tumor with a bistoury, and removed the friable parenchyma with a curette. Hemorrhage was managed by packing and ligating. | The cavity in the depths of the liver was forcibly packed with gauze and the ends were brought out of the external wound. The exterior wound was partially closed. Antiseptic dressings were held in place by a sand bag. | R. Recurrence 11 months after operation with symptoms of cancer of the liver. | Old and very feeble. No pain in region of tumor until he fell against the tongue of a coach; since then great pain and he lost flesh rapidly. Seventh and eighth ribs were broken in the accident. |
| 49 | Mikulicz. Revue de Chirurgie, 1896, No. 12, p. 991. | F. | 29 | Six months. Syphiloma of left lobe, size of fist. | Ablation with a sharp curette. Tamponed with iodoform gauze. Kept in place by cat gut sutures; gauze brought out the skin incision. | Returned to abdominal cavity. | R. | Diagnosis: Syphiloma or adenoma. |
| 50 | Girard. ditto, p. 992. | Infant. | 2 1/4 days | Two and a half days. Hernia of left lobe, through umbilical opening. | Remove the entire left lobe with cautery. Cat gut around the pedicle. Removed the gall bladder. | | D. Next day. | Diagnosis: Congenital umbilical hernia. Left lobe, protruded with the small intestines. |
| 51 | Bruns. Revue de Chirurgie, No. 12, 1896, p. 976. Beitrage kiin. Chirurgie, 1888. | M. | 50 | Six months. Cancer of right lobe. Size of a walnut. | Excised with a bistoury. The surface of the wound was passed over with a cautery. | The stump was returned to the abdominal cavity. | R. | Diagnosis: Cancer of omentum. Tumor was adherent to the peritoneum. |

| NO. | REPORTER AND REFERENCE. | SEX. | AGE. | DURATION, NATURE AND SIZE. | METHOD OF REMOVAL. | TREATMENT OF LIVER STUMP. | RESULT. | REMARKS. |
|-----|--|------|------|--|--|--|-----------------------------------|--|
| 52 | Ditto. | F. | 44 | Seven months. Echinococcus cyst. Size of a child's head on lobus quadratus | Removed by the cautery after ligating the pedicle by several silk ligatures. Hemorrhage was stopped by ligatures and sponges, which were steeped in boric acid. | The stump, 12 cm. long and 13 cm. wide was disinfected with HgCl ₂ and returned to the abdominal cavity. | R. In 19 days. | Diagnosis: Tumor of mesentery or omentum. |
| 53 | Schrader, Deutsch. med. Woch., 1897, No. 11, p. 173. | F. | 30 | Uncertain. Carcinoma, 4 cm. by 3.5 cm. | A wedge-shaped incision, followed by Paquein cautery. | Suture of the liver stump and fixation in the abdominal wound. | R. | Wound healed in eight to ten weeks. Operation April 25, 1890; still alive and well in March, 1897. |
| 54 | Eliot. Personal communication. | F. | 40 | Six months. Two fists. Alveolar sarcoma in fissure for gall bladder. | Thermocautery. Large vessels ligated. | Stump four or five inches long, two inches thick. Dropped into abdomen and walled off by gauze packing. | R. | Disease returned in intestine which was adherent. Died four months after operation. |
| 55 | Rosenthal. Deutsch. med. Woch., 1897, No. 4. | F. | 41 | Six weeks. Size of head. Angioma fibrotodes of lobe of spigelius. | Elastic ligature. Tumor removed by knife beyond the ligature. | Stump touched with zn. cl. edges sutured and fastened to abdominal wall by a needle passed transversely and then by sutures. | R. | Well after fifteen months. Tumor between tumor and liver. Thought to be an ovarian, omental, or hepatic tumor. |
| 56 | D'Urso, Centralbl. Chir., 1897, p. 397. | | | Size of head. Endothelioma. | Attempted to shell out the pedicle but on account of hemorrhage placed an elastic ligature on it and treated it extra peritoneally by suture. | Extra-peritoneal. | D. In 2 days. Exhaustion. | Tympany between the tumor and liver, Uncertain diagnosis. |
| 57 | Watson, Boston Med. & Surg. Journal, Sept., 1896, p. 63. | F. | | Cancerous disease of the gall bladder and lower anterior portion of the right lobe of the liver. | Three rubber ligatures were passed through sound liver tissue and the diseased area was removed in three separate pieces. | The ligatures were left <i>in situ</i> and came away at the end of three weeks. | D. Sixty days after operation. | Gall bladder contained 102 stones. Disease recurred in two months. |
| 58 | Landouzy and Segond, Bulletin de la Societe de Chirurgie de Paris, 1887, No. 13. | M. | 15 | Three months. Echinococcus cysts. | Abdominal section. Aspirated. Fastened the liver to the abdominal wall with two silver sutures. Removed the cyst wall also the liver tissue that covered the cyst. Bleeding surface packed with sponges. | Fixed the stump to the abdominal wall with suture and drained. | R. | |
| 59 | Keen, Present paper. | F. | 53 | Three years. Angioma of the left lobe. Three by two and a half inches. | Artificial pedicle made by two oblique lateral incisions by Paquein cautery; then elastic constriction of pedicle by rubber drainage tubing | Tumor fixed outside abdominal wall. Removed by scissors on sixth day. No hemorrhage. | R. | |

DISCUSSION.

The President: A case of tumor of the liver came under my observation some time ago. The tumor was situated in the median line, quite prominent. Diagnosis made was cyst of the pancreas. The abdomen was opened and the cyst found to have originated in the left lobe of the liver. This entire lobe of the organ was occupied by the cyst. It was removed after ligation of the peritoneum above it. The left portion of the liver was raised out of the wound and ligated, but the ligature cut through. The catgut ligatures cut through the blood vessels. Such changes had taken place in the liver structure in this region as to make the portion near the cyst much softer. The area was seared with thermo-cautery, and in this way hæmorrhage was pretty effectually controlled. There was some discharge of bile. The bile duct leading to the left lobe was secured with ligature and the wound closed, with the exception of gauze packing. The patient did well for the first twenty-four hours. During the second twenty-four hours there was a marked decline and general condition of collapse.

Upon removing the gauze we found a large quantity of bile. The patient died in forty-eight hours.

Dr. Evan O'Neill Kane (Kane): The matter of secondary hæmorrhage, after the removal of a tumor of the liver, is of considerable importance. In a case I operated on last winter, for Drs. Stonecipher and Towler, I removed a tumor the size of the head of a six months child. It grew from the base of the liver well in at the back. In this case there was a great deal of hæmorrhage during the detachment of the growth—an alarming amount of hæmorrhage; but it was quite readily controlled, first, by packing, and then by hot water. But afterwards, I think about six days, secondary hæmorrhage commenced, and continued about five or six days, during which the patient gradually sank. I was not there, but the attending physician made every attempt to control it, but could not.

Another thing I want to mention. Dr. Keen spoke of tympanites on percussion above the growth. I noticed the colon was pushed well up between the liver and the top of the growth.

