PARTIAL RESECTION OF THE LIVER IN EARLY CARCINOMA OF THE GALL-BLADDER

(Middle Lobectomy)

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Since SCHALM *et al.*, among others, have pointed out, that the liver has a tremendous « functional reserve capacity », it is understood why the surgeon is able to remove large parts of the organ, without apparent ill effect to the patient. Moreover, subsequent to the resection, regeneration takes place (GLUCK, PONFICK), so that the organ regains its pre-operative weight, within a relatively short period of time (LOCALIO *et al.*).

Therefore, it is not as imperative, as in the case of the lungs (where every type of resection is attended by a loss of function), to choose the smallest possible hepatic territories for resection (i.e. segmentectomies), thanks to the great « functional reserve capacity » of the organ, and its regenerative power. On the other hand, involvement of the liver, as in cancer of the gall-bladder, may necessitate such an extensive resection (at least when it is going to be an anatomically and physiologically justified operation along the lines developed by COUINAUD and others), that in a number of cases insufficient liver tissue stays behind to support life. For those reasons, we developed a less extensive, anatomically justified, partial resection of the liver, suitable for the treatment of *early* cancer of the gall-bladder.

The first organ usually involved, in cancer of the gall-bladder, is the *liver*. PAYR (1908) stressed the fact that, in most of the early cases without macroscopical extension into the liver, there is nevertheless *microscopical* involvement. VADHEIM *et al.* reported macroscopical direct extension into the liver in 67.5 % of his cases!

Before starting an operation on the liver, it is necessary to know which part of the organ is involved. That is why we

studied the extent of the invasion of gall-bladder cancer into the liver, by means of the injection-corrosion technique.

The affected area, corresponding with the hepatic territories adjacent to the fossa cystica, coincided with the caudal areas of the right and left paramedian lobe, and the medio-caudal area of the lobus dexter (figs. 1 and 4).

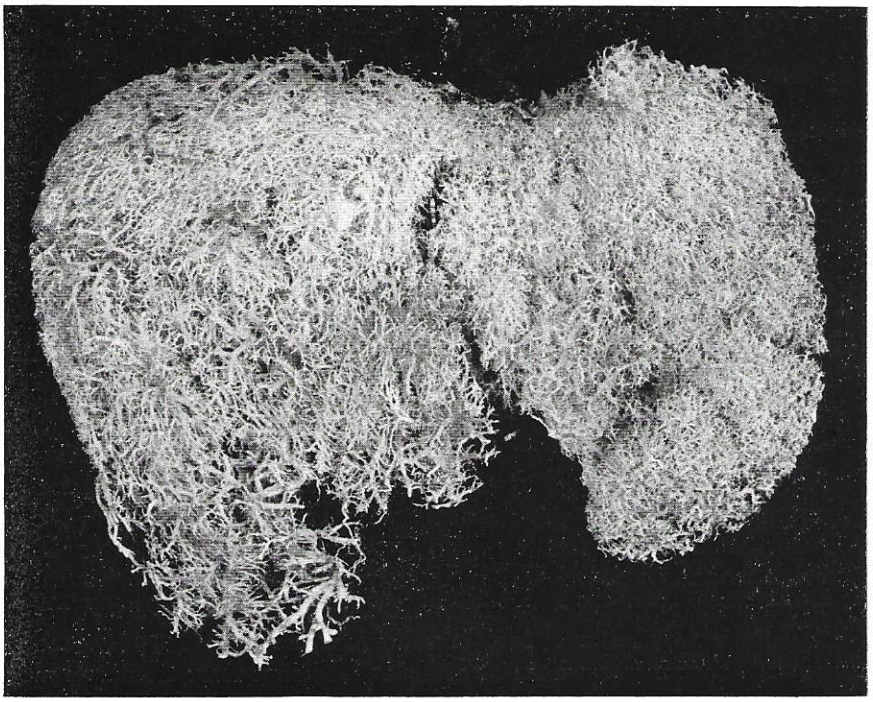

FIG. 1.

Corrosion specimen, ventro cranial aspect. Notch caused by direct extension of carcinoma of the gall-bladder.

Both paramedian lobes together form *one* surgical liverlobe: the *middle lobe*, which, as such, has its own afferent and efferent structures at both hepatic gateways. The first gateway is the porta hepatis, or hilum of the liver; the second one is the central cranial liverpole, where the hepatic veins leave the organ.

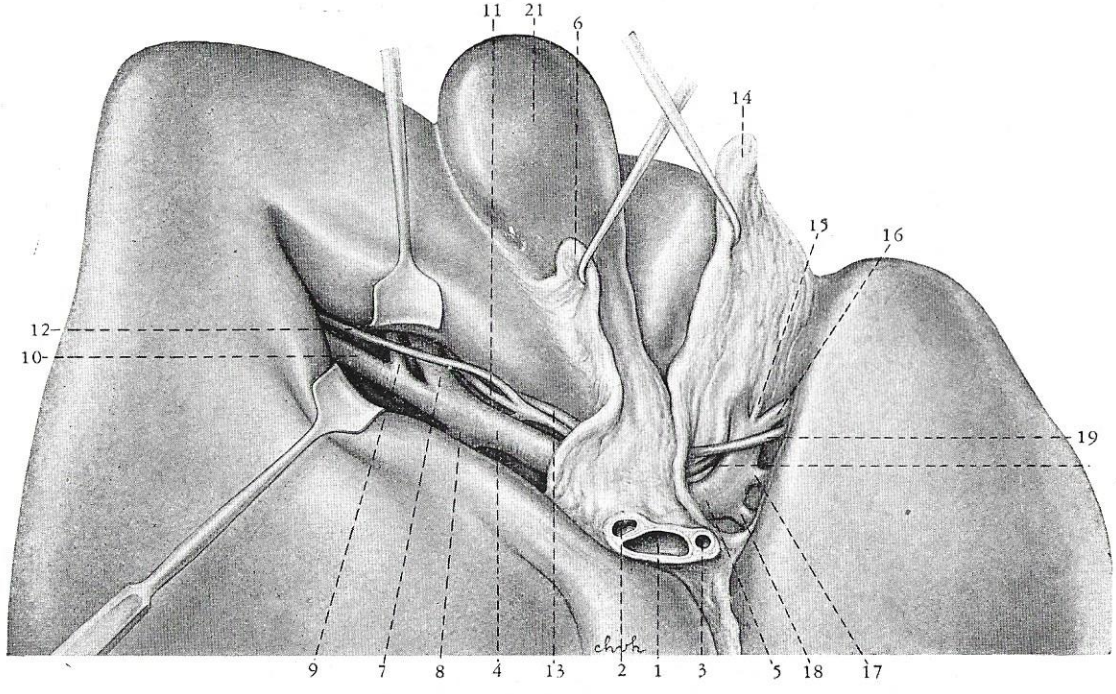

FIG. 2.
Topography of the hilum of the liver.
The edges of the incissura dextra are held apart by eyelid-retractors.

The Glissonian pedicles of the middle lobe, at the hilum, consist of the right (fig. 2, no. 4), and the left paramedian veins (fig. 2, no. 17) and their corresponding arteries and bile ducts. The pedicle at the cranial liverpole, consists of the middle hepatic vein (fig. 3, no. 5).

Ligation of the Glissonian pedicles at the hilum and the middle hepatic vein, below the diaphragm, blocks the entire circulation of the middle lobe. Incision of the liver within the boundaries of the middle lobe therefore will not provoke haemorrhage.

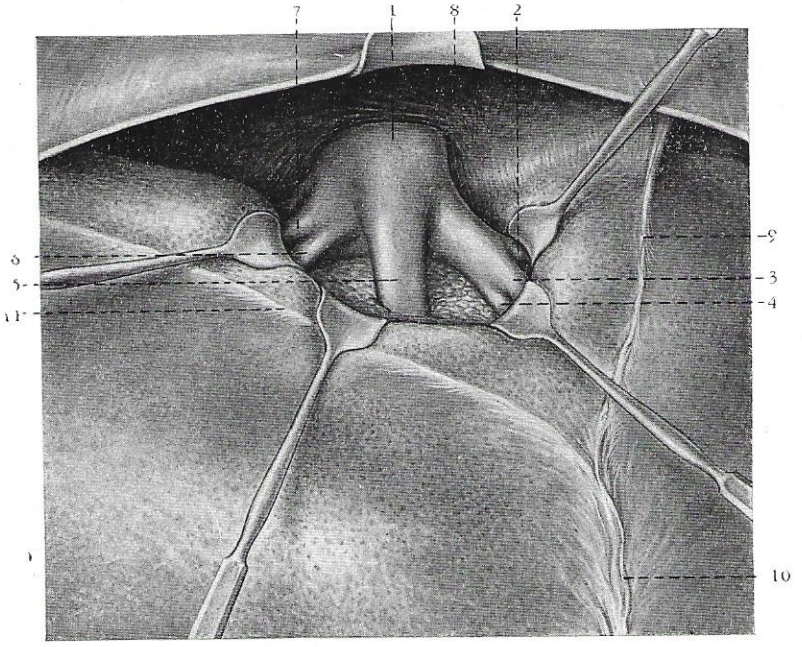

FIG. 3.
Upper pole of the liver.

The middle lobe is bordered to the left by the left interlobar fissure, dorsally by the dorsal fissure and to the right by the right interlobar fissure. Of these fissures, the left interlobar and dorsal fissures show a fairly constant course, however the position of the right interlobar fissure may vary (figs. 5 and 6).

The *left* interlobar fissure cuts the ventral surface of the liver along a line corresponding to the connecting line between

the umbilical incisure and the left wall of the caudate lobe. The plane through this fissure passes along the left lateral wall of the vena cava inferior; hence it is not perpendicular to the horizontal plane (which can be imagined as passing through the hilum) but forms an angle with it varying from 45° to 75° with the mouth of the angle turned to the left. The plane can be fairly simply defined with reference to the following points:

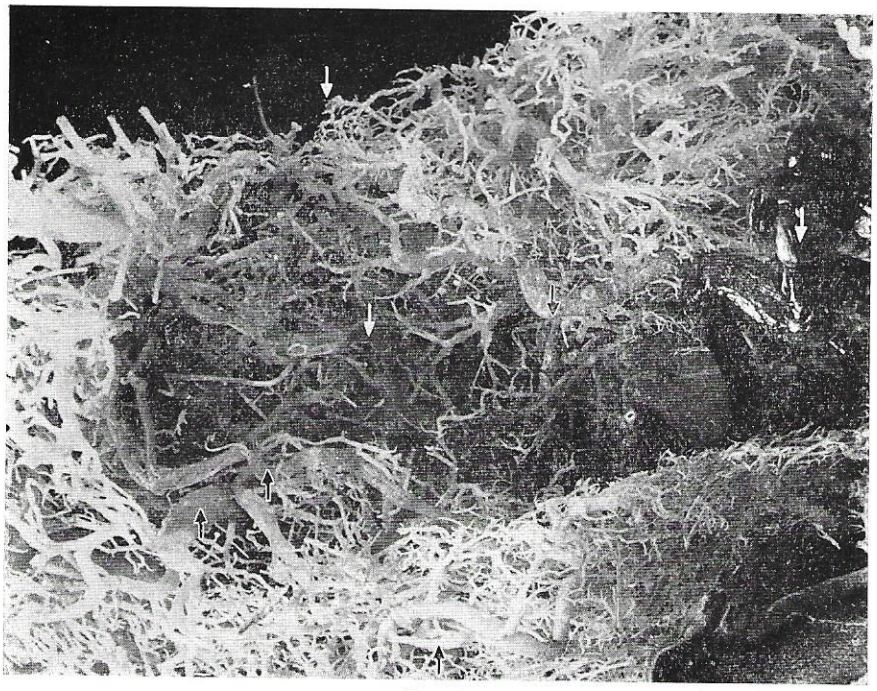

FIG. 4.

Hepatic vein (white), portal vein (dark) injection-corrosion specimen. Arrow marks the left interlobar hepatic venule.

the connecting line between the umbilical incisure and the left wall of the caudate lobe, the left lateral wall of the vena cava inferior and the interlobar hepatic venule, marking the plane of the fissure by its course (fig. 5).

The *dorsal* fissure separates the caudate lobe from the middle lobe. The plane of this fissure corresponds with the plane in which the major hepatic veins lie. This frontally placed fissure

which cuts the cranial pole of the liver in an arc (see fig. 5), cuts the superior wall of the liver hilum in virtually a straight line.

The right interlobar fissure is more variable and less readily identified at the surface of the liver, than the fissures referred to previously. The right hepatic vein is situated in the plane of the fissure which divides the right paramedian lobe from the right lobe.

Usually the fissure intersects the right lateral wall of the fossa cystica. In those instances, the area to the right of the fissure—anatomically belonging to the right lobe—is also in-

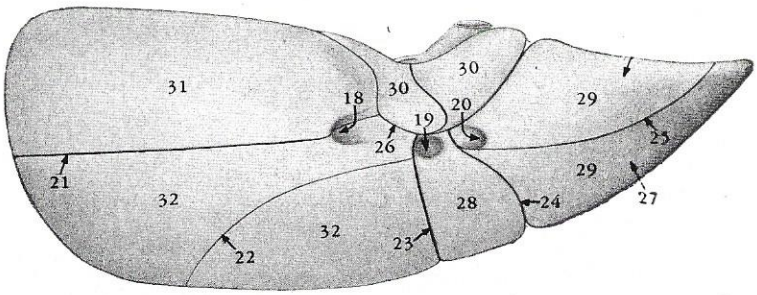

FIG. 5.

Cranial aspect of the liver. 18 : right hepatic vein; 19 : middle hepatic vein; 20 : left hepatic vein; 21 : right interlobar fissure; 23 : middle fissure; 24 : left interlobar fissure; 26 : dorsal fissure; 28 : left paramedian lobe; 29 : left lobe; 30 : caudate lobe; 31 : right lobe; 32 : right paramedian lobe.

28 + 31 + 32 = pars dextra hepatis.

volved by the carcinoma. This area of the right lobe, which is attacked by the disease, consists of a thin slab of hepatic tissue. In many cases it seems to us unnecessary, not to say inadvisable, to remove the whole right lobe, in toto with the middle lobe, merely for the sake for this small section; in other words to perform a resection of the pars dextra (fig. 6).

It appears, that in 60 % of livers this area to the right of the fossa cystica, which we designated « area paracystica » has an own Glissonian pedicle, issuing from the vena dextra. This pedicle can either be approached from the hilum or by enlarging the hilum in the course of the right portal vein trunk (see further).

In 10 % of the livers, the area paracystica did not belong to the caudal segment of the lobus dexter, but to the right paramedian lobe. No paracystic vein appeared to be present in those specimens, and in these instances a middle lobe resection *tout court* suffices in the treatment of early cancer of the gall-bladder.

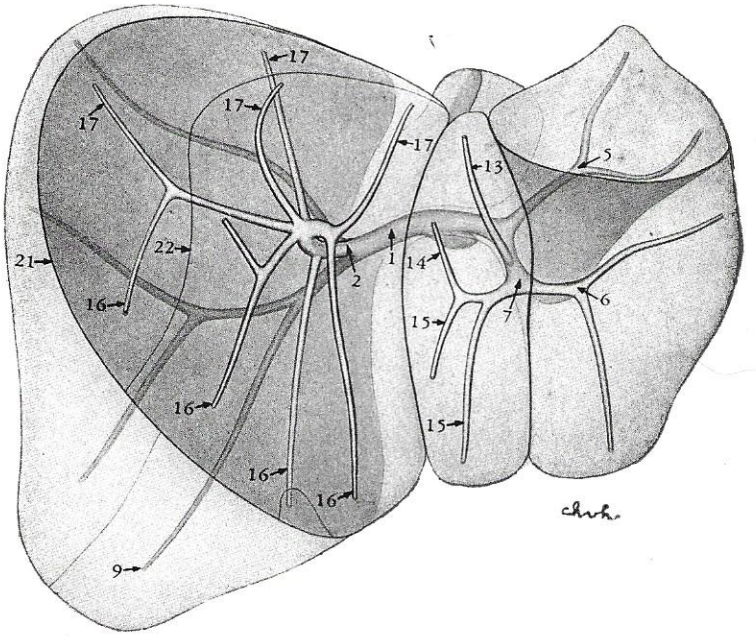

FIG. 6.
Ventral aspect of the liver.
9 = paracystic vein.

In the other 30 % neither a paracystic vein nor a vena dextra were present. In those instances the area paracystica does not have an own Glissonian pedicle so that the whole caudal segment of the lobus dexter has to be removed in toto with the middle lobe.

Following exploration of the abdomen the exploratory abdominal incision is extended into the thoracic cavity. A sandbag is placed under the patient's right side in the renal region. The

thoracic incision is made over the 8th intercostal space up to the mid-axillary line to the right, and across the costal margin to the left. The incision is continued into the chest (fig. 8A).

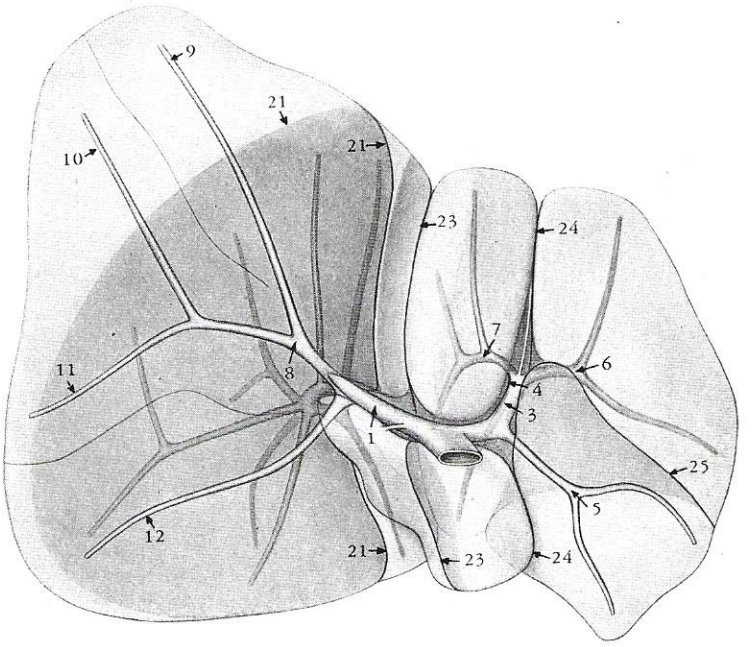

FIG.. 7.

Dorsal aspect.

1 : right portal vein trunk; 2 : right paramedian vein; 7 : left caudal paramedian vein; 8 : vena dextra; 9 : vena paracystica; 10 : vena caudalis lobi dextri; 11 : vena cranialis lobi dextri; 13 : left cranial paramedian vein; 21 : right interlobar fissure; 23 : middle fissure; 24 : left interlobar fissure.

The common costal cartilage is divided between the 8th and 9th ribs. A radial incision, extending from its origin at the point of division of the costal margin to the inferior vena cava, divides the diaphragm. A Finochietto retractor is placed between the divided ribs, and spread out. The falciform ligament is divided. Right lung, stomach and intestines are packed with moist pads; the former in an upward direction, the latter downwards and sidewards.

The liver is gently retracted downwards, stretching the triangular ligament (see fig. 8B). This ligament consists of two leaves, an anterior ligamentum hepato-diaphragmaticum and a posterior one, the ligamentum hepato-renale. Between these two leaves the cranial pole of the liver is bare and very friable. The anterior leaf is first divided, the dome of the liver being followed and care taken to avoid injury to the diaphragm. To free the liver further, the hepato-renal ligament at the dorsal right side has to be severed. The right half of the liver is therefore gently rotated upwards, the ligament being divided during the rotation; the scissors should remain close against the liver to avoid damage to the right adrenal gland.

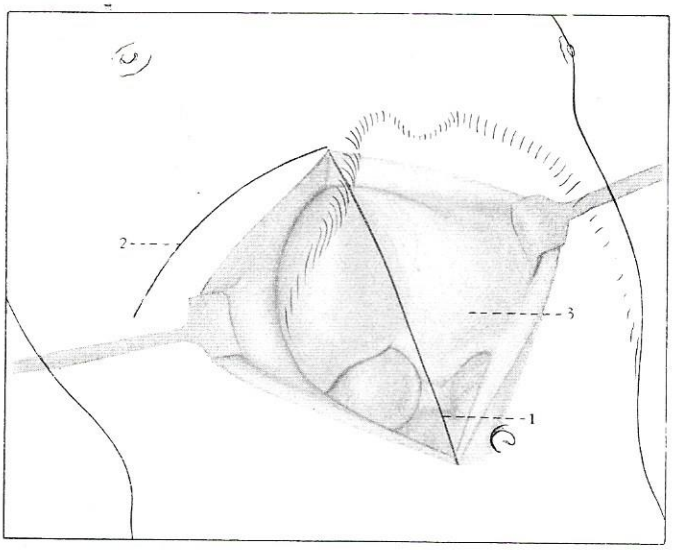

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FIG. 8 A.

The right part of the liver is thus completely free from the surroundings, and is freely movable for a considerable distance in almost all directions. When the right lobe is rotated to the left, the inferior vena cava is stretched and can be identified by its peritoneal covering. While this vessel is dissected out, the venae hepatica breves, on the right, become visible (fig. 8C, no. 8D). These veins are attended to after ligation of the hilar structures.

This is when hilar dissection may begin. The liver is rotated upwards through the diaphragmatic defect into the right lower thoracic cavity, during which manoeuvre the hilar region is exposed. When removing the liver from its bed, care should be taken not to overstretch the hilar structures.

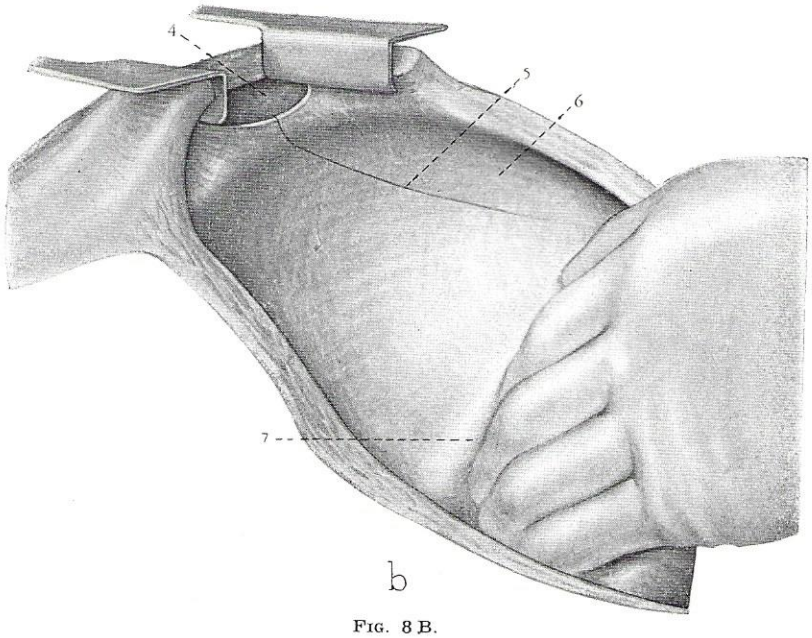

FIG. 8 B.

The cystic duct and cystic artery are ligated and divided. An extensive hilar dissection can be circumvented by making straight for the lobar Glissonian pedicles, detaching these and ligating these at the most distal possible point. Moreover the hilum can be enlarged in the course of the branches of the portal vein, a decided asset, especially on the right side, if there is no right incisure, or only a small one (see fig. 2). It

means that a right incisure can be made by enlarging the hepatic gateway from the edge of the hilum. Given a blunt incision in the produced part of the right trunk of the portal vein and the right vein and provided penetration into the liver be not too deep, haemorrhage is virtually obviated. The hilar edges are held apart by means of eyelid retractors (modific-

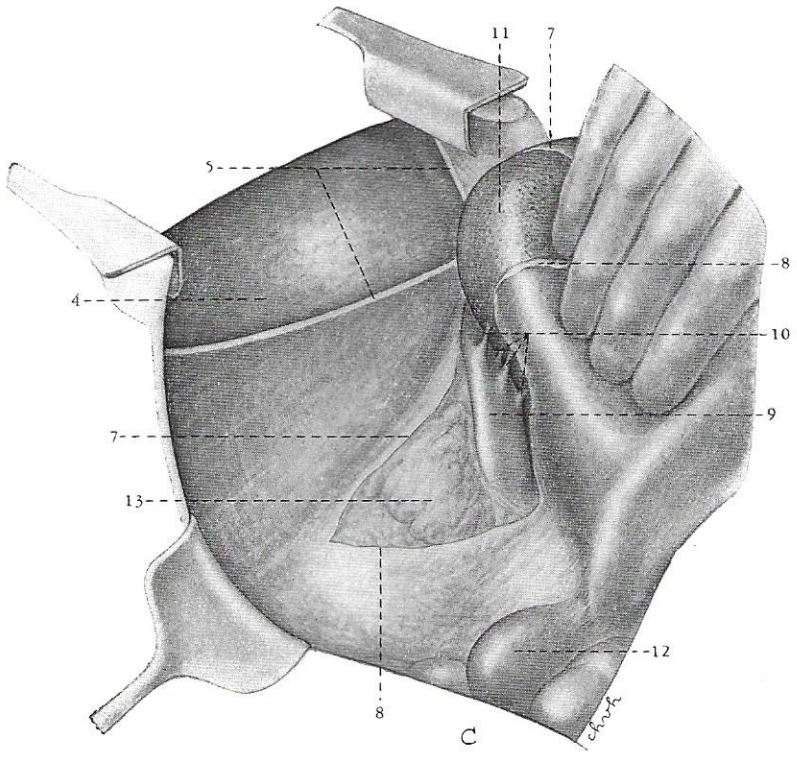

FIG. 8 C.

ation DESMARRES). In this way even the right vein, which runs fairly superficially under the dorsal surface of the liver, can be followed to where the paracystic vein arises.

As soon as the Glissonian pedicles of the paracystic area, of the right paramedian lobe and the caudal area of the left paramedian lobe are exposed, ligatures are applied around these structures but are not tied.

The middle hepatic vein is dissected out at the cranial pole of the liver, (see fig. 3) and ligaturated, which is followed by engorgement of the middle lobe; as soon as the area of the right interlobar fissure is clearly demarcated, the Glissonian pedicles are ligated. The liver is opened bluntly (fig. 8D) along the right interlobar fissure, which is running slightly to the right

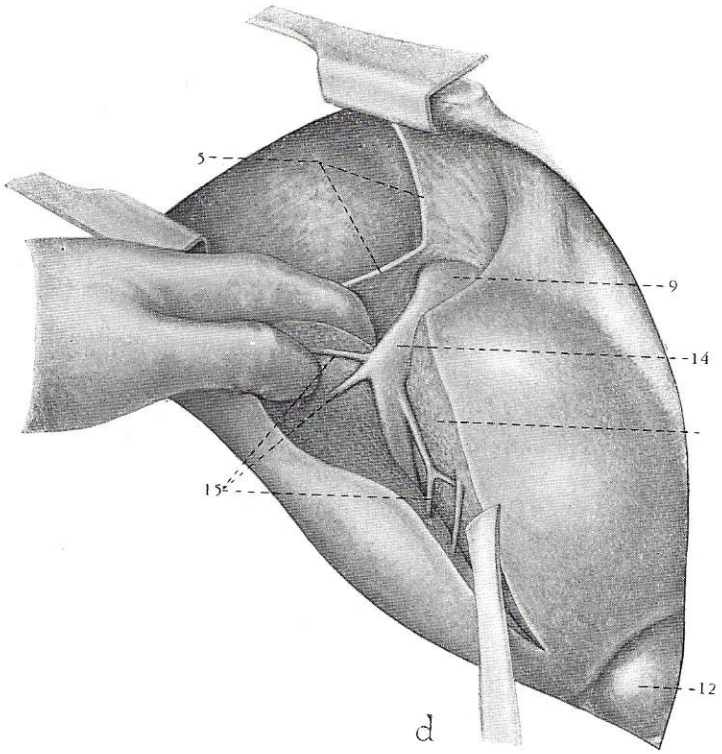

FIG. 8 D.

of the line of demarcation. Minor branches running from the right paramedian lobe to the right hepatic vein are ligated individually. The boundaries of the area paracystica can seldom be established with absolute certainty beforehand. What the surgeon does know during resection, after the paracystic vein has been ligatured, is that he is working within the boundaries if incision does not provoke bleeding.

The left interlobar fissure is opened in the same way. The Glissonian pedicle of the ventro-cranial part of the left paramedian lobe is attended to (fig. 6, no. 13).

The dorsal fissure is opened, taking care to avoid injury to right and left hepatic vein. Thus the whole middle-lobe area is freed from the surrounding parts, and can be taken out, after Glisson's capsule and the containing structures have been dissected out of the hilum. The raw surface is covered with omentum and drains are left in the sub-diaphragmatic space and in the area of resection. The wound is closed in layers.

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All the illustrations are taken from :
GANS : *Introduction to Hepatic Surgery*. (See above.)