Ross(G) & Osler(W.)

CASE OF

ANEURISM OF THE HEPATIC ARTERY

WITH

MULTIPLE ABSCESSES OF THE LIVER.

BY

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AND

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(Read before the Medico-Chirurgical Society of Montreal.)

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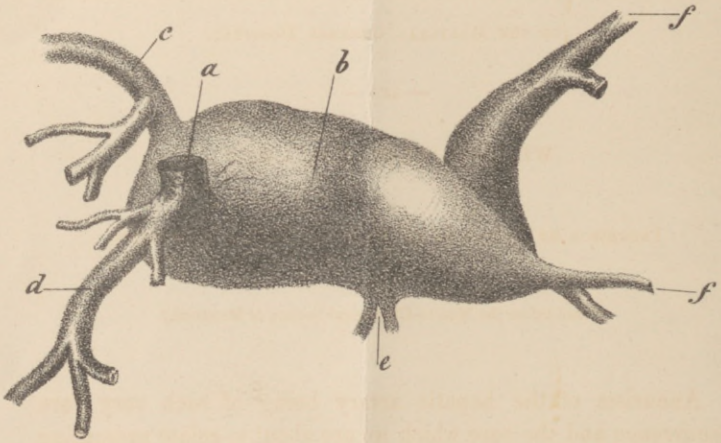

ANEURISM OF THE HEPATIC ARTERY.

(*a*) Hepatic artery, (*b*) right branch mainly involved, (*c*) left branch, (*d*) gastro-duodenalis, (*e*) cystic arteries, (*f*) occluded branches of right trunk.

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Aneurism of the hepatic artery being of such very rare occurrence and the case which we are about to relate presenting in addition some remarkable pathological features, we are led to believe that it will be found of considerable interest.

For the notes of the case we are indebted to Mr. JOHN BRODIE, ward clerk.

W. H., æt. 21, single; height 5 feet 11½ inches; weight, about 140 lbs, — was admitted into the Montreal General Hospital on the 8th of November, 1876, complaining of pains in the right side and great weakness.

The patient was born in Wisconsin, U. S., and lived there until about two years ago, since which time he has resided in this city. His family history, as far as could be ascertained, is good. Has never been ill with the exception of small-pox, and a mild pneumonia of the left lung. Has never had dysentery nor

piles, nor any abdominal or rectal trouble of any kind. Has always been of extremely temperate habits.

His present illness began, he says, about the 1st of September last, with what he describes as a severe cramping pain in the stomach, which began in the morning and continued all day. At 4.30 p.m. of that day he had a violent rigor, lasting about twenty minutes. This was followed by high fever and perspiration. Similar chills recurred, he says, with great regularity, every second day for five or six times, and then ceased after he had taken some medicine from the Hospital Dispensary. At this time his appetite became poor, he felt weak and was very low-spirited, and observed that his skin assumed a sallow colour. Ever since he has been gradually getting weaker and losing flesh pretty rapidly, and the sallow tint of the skin has been steadily increasing in intensity. There has also been almost constantly present a dull, aching pain in the right side over the region of the liver. Slighter rigors, followed by fever and some perspiration, have also occurred several times at irregular intervals.

Present Condition.—Much emaciated, somewhat anæmic, but the whole skin of a dirty, dingy, sallow hue, without any jaundice,—the sclerotic clear, and not yellowish, There is a very peculiar, pungent, somewhat feculent and extremely disagreeable odor exhaled from the surface of the body.

There is slight fullness of the right hypochondriac region which is also somewhat tender upon pressure. *Liver.*—Dulness extends from the 4th interspace to one inch below the margin of the ribs. The belly is full and tumid, and tenderness is also found on pressure over the epigastrium. Splenic dulness not increased. Tongue slightly furred, rather dry, and with red edges. Bowels have been, and still are, considerably relaxed, the motions being light-coloured and especially offensive. Urine, sp. gr. 1019, high-coloured, but containing neither bile pigment, albumen nor sugar.

Heart—Situation and sounds normal, pulse 116. *Lungs.* Resonance and breathing normal throughout, except at the base of

the right lung where there is an area of dulness with enfeebled respiration. Temperature 105° F.

Ordered quinine gr. xx each evening.

Nov. 11*th.*—Has not complained much of the pain. Disagreeable odour from the body very marked. Bowels are regular, but motions are ochre-coloured and offensive. Tongue clean. A dull red flush on cheeks especially in afternoon. Has occasional slight epistaxis. Temperature has ranged between 102°F. and 103° F.

16*th.*—Is getting weaker but is quite cheerful, and feels well. Tongue moist and clean. Takes nourishing food very well, and bowels remain regular. Never vomits. Temperature continues equally high, always rising 2° or more in the evening, followed by sweating which is sometimes very profuse. This usually commences at 6 p.m. Urine 43 oz. sp. gr. 1022. No bile pigment, albumen or sugar.

23*rd.*—The volume of the liver has considerably increased, and, owing to the progressive emaciation, bulging of the lower ribs on the right side has become quite apparent. Dulness extends from the top of the 4th rib to two inches below the margin of the ribs. The lower edge of the liver cannot be felt owing to the fulness of the abdomen and its tender condition. Pain on pressure over liver region and epigastrium increased. His strength is failing fast, and the sallow colour has become deepened. The odour from his body has been so offensive in the ward for some time that the House Surgeon has been obliged to employ spongings with carbolized solutions, and disinfectants round the bed. He lies almost continuously on his back, occasionally turning slightly towards the right side, but any attempt at turning on his left side is accompanied by severe pain and a feeling of a dragging and weight in the region of the liver. The superficial veins on the right side of the chest are very large and prominent. Ordered linseed poultices over the liver.

25*th.*—Tenderness less. Hepatic dulness increased in area, measuring 8 inches vertically at the line of the nipple. No localized fulness or redness of the skin or fluctuation to be found

anywhere. The enlargement of the organ is very general and uniform. Pulse 128, very small and feeble. Temperature continues high with evening perspirations. Is remarkably cheerful, saying he feels well but weak, although he suffers a good. deal of pain. Ordered acid nitro-mur. dil. Tr. calumb., a a ℥ss ter die.

29*th.*—Pain and tenderness low down on the right side, Excessive pain is caused by the slightest change of posture. Lies constantly on the right side. Pulse 130. His diet throughout has been of a most nourishing kind. Milk abundantly, beef-tea, eggs, wine, &c.

Dec. 3*rd.*—This morning there occcurred a temporary collapse, marked by a rapid fall of the thermometer to a remarkably low level, 94.8°. F., accompanied by great prostration and a cold sweat. In the evening the temperature rose to 102.4.° F., and during the night great pain was felt in the left iliac region, which was tender.

Ordered an opiate, and a small blister to this region.

6*th.*—Is rapidly sinking. The signs of effusion in the right pleura, hitherto stationary, have in the last few days, rapidly extended, and there is now dulness over the lower two-thirds of that side, with absence of breathing, and an amphoric note beneath the right clavicle.

7*th.*—Died at 6.00 a.m.

Autopsy, 31 hours after Death.

Rigor mortis present. Skin of a dirty-brown colour. In the abdomen about 22 oz. of yellow turbid fluid. In the right pleural cavity about 20 oz. of similar fluid. *Right lung* collapsed. The pleura covered with a thin layer of greenish-yellow lymph. On section, the lung is dark, airless and sodden. *Left Lung.* On the visceral layer of the pleura, especially behind, are numerous small ecchymoses. On section, organ contains much blood, is firm, and only slightly crepitant. *Heart* normal. *Kidneys* rather pale, cortex swollen, and malpighian tufts injected. *Spleen*, weight 445 grms. (14 oz), adherent to the stomach. Organ soft. On section dark and congested.

Intestines normal. No trace of ulceration in the large intestine. *Bladder* and prostate, normal.

Liver, 4879½ grammes, (10¾ lbs). The peritoneum around it in many places showing signs of inflammation. The left lobe intimately adherent to the stomach by a thick layer of firm yellowish-coloured lymph. The right lobe also cemented to parts in its neighbourhood by lymph of a similar character. A small amount is also observed on the descending colon, but the general peritoneal surface is not affected, the serous covering of the intestines being clear and glistening. The liver itself retains its normal shape, the upper surface is smooth and not adherent. Towards the right border a yellowish-coloured swelling is evident which is perceptibly fluctuating. Other less distinct yellowish spots are seen scattered over the organ. To the touch the upper and back part of the right lobe is exceedingly soft and fluctuating. On the under surface many yellowish-white nodules are apparent, some large, others quite small, all distinctly fluctuating. A similar one of large size is apparent on the under surface of the left lobe. A transverse incision through both lobes reveals the fact that we have to deal with a diffuse suppurative hepatitis. An immense quantity of yellowish-white, custard-like pus flowed out. The right lobe is completely honey-combed by a series of small, closely united abscesses, ranging in size from a marble to a walnut. The septa between these absceses are composed of a dark-red tissue. Most of these small abscesses communicate together; some have merged to form larger ones. They all possess distinct lining membranes which are frequently stained with bile. The left lobe is in a similar condition, and in both the abscesses extend throughout the thickness of the organ. Thus, the only portions of liver-substance which are found comparatively free are the lobus quadratus and that portion of the organ lying immediately above and a little to the left of the gall bladder. These parts on section are of a dark colour, lobules distinct, small bile vessels very evident. The gall-bladder is small, contains about three drachms of a clear, somewhat viscid secretion. On pressing it and along its ducts no fluid could be forced out at the papilla biliaria. It was with

much difficulty that a probe could be passed along the cystic duct, owing to an unusual number of irregular folds of its mucous membrane which were evident when the duct was slit up. The common bile duct itself was patent, the mucous membrane of its upper two-thirds stained with bile. There were no clots in the superior mesenteric, gastric, or splenic veins. On slitting up the portal vein itself, a small abscess was found to project into the calibre of one of its right divisions. The tissue in the neighborhood of these main divisions was infiltrated with pus. A firm nodule was felt at the portal fissure and mistaken at first for a bunch of lymph glands. Section of this, however, showed it to be distinctly laminated, and careful dissection of the part revealed the existence of an *aneurism* just at the bifurcation of the Hepatic Artery, but occupying chiefly the right branch. (see plate.) The dilatation begins immediately beyond the gastro-duodenalis, (*d*) and extends for about 3 inches as a somewhat conical swelling. The left hepatic artery (*c*) arises from the obtuse end of the aneurism and is unaffected. At its thickest part its circumference measures 3 inches. For 2½ inches it passes to the right and gives off two branches (*f*) which appear occluded, then turns at right angles and passes backward for 1¼ in., towards the posterior border of the liver, terminating by a conical extremity which is continuous with the main branch of the artery. The arteries of the body had been injected, and the red mass is found in the trunk of the hepatic before its bifurcation, in the gastro-duodenalis, and the left hepatic branches, all of which are full and tense. The hepatic artery appears to enter the aneurism about ¼ of an inch from the obtuse end, the gastro-duodenalis and left hepatic being given off apparently from the dilatation itself; and on slitting up the hepatic artery it appears at first sight as if these were its only branches, and that its communication with the aneurismal sac had become obliterated. Careful inspection, however, of the lower and posterior wall reveals a small canal, the calibre of a hypodermic needle, which leads directly into the sac. The aneurism being opened by a longitudinal cut on the upper surface, it is seen that the anterior third, comprising the rounded end, is completely filled with firm

decolourized laminæ of fibrin, concentrically arranged. The middle third of the sac contains semi-coagulated blood, and red injection mass, after emptying which there is seen a cavity about the size of a small walnut. This is in communication with the hepatic artery by the small canal already referred to, which passes for rather more than half an inch through the fibrinous laminæ of the anterior end. Two small branches, both containing injection pass from the cavity, one the cystic, (*e*) going to the gall-bladder, the other a somewhat larger branch, passing to the central part of the organ. The sac is lined with sheets of fibrin, which, at the under part were thinner than elsewhere, and at this point the blood has infiltrated the proper coats of the aneurism, which, in consequence, look reddish black. The terminal portion of the sac lay chiefly in the substance of the right lobe, surrounded by suppurating hepatic tissue, which had to be dissected away to expose it; and on section the cavity is found almost completely obliterated by fibrinous laminæ, which in the centre are softer, and not so colourless as the other end of the sac. No direct passage could be traced through this from the central cavity, and the main branches given off from the aneurism are found empty, and at their commencement plugged with fibrin, which in several extends as a thin sheet along the intima.

The condition appears to be one of simple aneurismal dilatation of the vessel. the walls being thin, slightly roughened on the interior, but not markedly atheromatous. The trunk of the hepatic artery itself looks healthy, and there are no evidences of general vascular degeneration.

Remarks.—Aneurismal dilatation of the Hepatic Artery would appear to be of rare occurrence, the chief reason, of course, being that its main cause—atheromatous degeneration—is very seldom met with in this situation. Embolism of this artery Frerichs has never seen—the situation and mode of giving off of the vessel being such as to hinder the entrance therein of foreign substances from the stream of the aorta. One single case of the kind has been recorded by Virchow, where an hepatic abscess followed embolism from a gangrened lung.

The same author (Frerichs) alludes to four, or possibly five,

as the only recorded cases of Aneurism of the Hepatic Artery. They are those of Ledieu, Stokes, Sestier, Wallmann and Lebert. In the case of Ledieu, the patient died of some pulmonary complaint, and had never had any symptoms of hepatic disease. There was found, just before the giving off of the pyloric branch, on the hepatic artery, a small hard tumour the size of a hazel nut. It was entirely composed of firm laminated fibrin, and had completely occluded the main artery. The case of Sestier was also obscure. There had been " symptoms of some chronic painful affection of the stomach." The right branch of the vessel was found occluded by a small aneurism filled with clots, and the gall-bladder was gangrenous.

In Wallmann's patient—a female—there was an account of attacks of violent pain in the upper part of the abdomen, coming on after intervals of several days, gradual loss of strength, and emaciation. There was enlargement of both liver and spleen. No ascites; no fever. Then there supervened obstruction of the ducts with perceptible fulness of the gall-bladder, and very deep jaundice. She was believed to be suffering from gall-stones. Then fever, abdominal tenderness, collapse and death. A large aneurismal tumour was found in the situation of the lesser omentum. It was the size of a child's head, and showed a rent communicating with the cavity of the abdomen.

Lebert's case was accompanied by severe pains in the pit of the stomach, followed after a time by hæmatemesis and melæna. Vomiting was persistent, and the patient soon died. The aneurism involved the main trunk of the vessel, and communicated by a fistulous opening with the gall-bladder, by which means the blood had found its way into the duodenum and stomach.

From a relation of these cases Frerichs sums up as follows the clinical features resulting from this lesion:

" The symptoms to which aneurism of the hepatic artery gives rise are accordingly of a three-fold nature. In the first place there is the tumour, which is sometimes remarkably large and displaces the liver; secondly, there is the neuralgic pain, produced by pressure upon the hepatic plexus of nerves; and lastly there is jaundice caused by compression of the bile ducts. The

fatal termination in most cases takes place under symptoms of internal hæmorrhage."

We are inclined, therefore, to look at the record of the present case as of considerable importance, inasmuch as it clearly shows that besides, or even without, any of the symptoms mentioned by writers as accompanying aneurism of the hepatic artery, it may actually institute an entirely different series, — those namely of acute suppurative hepatitis of a diffuse character. The case as it came under observation was one presenting the marked characteristics of the latter disease, and every possible source of contamination of the portal system which might have given rise to it was interrogated in vain. Of course, we need hardly say that the real cause was entirely unsuspected, nor do we see but that the diagnosis of the aneurism was truly impossible. In the future, however, we must admit, in cases owning no other evident cause, that hepatic aneurism may be the starting point of acute hepatic abscess.

Among the many interesting points in connection with this case, the causation of the multiple abscesses takes the front rank; not only because in this one alone among the recorded cases was the fatal termination due to a suppurative hepatitis, but also on account of the extreme rarity in the human subject of opportunities of studying upon this organ the effects of disease of the hepatic artery. Taking for granted, as from the careful examination we may justly do, that the portal system did not in this instance furnish the materies morbi, we have to consider the consequence of total obliteration of the hepatic artery, or of its main branches, and also the effect of small emboli, in the form of particles of fibrin, plugging its terminal twigs.

It will be necessary first to refer briefly to a few anatomical and pathological points in connection with the blood supply of the liver. This, as in the lungs, is two-fold; the portal vein ministering solely to the functions of the gland, the hepatic artery chiefly to its nutrition. The ultimate branches of the portal vein ramify at the periphery of the lobules, forming the interlobular vessels, from which numerous capillaries pass into the interior, and finally converge to the centres of the lobules, as

the ultimate radicals of the hepatic veins. The hepatic artery furnishes blood to the bile ducts, portal and hepatic veins, and the connective tissue of Glisson's sheath. Its capillaries empty their blood by small venules into the interlobular veins. Hence, remembering this distribution of the hepatic artery, it is easy to understand how that in cases of thrombosis of the portal vein, even where the obstruction is complete, the functions of the organ may be maintained, and both bile and glycogen secreted; for the capillary plexus of the lobules continues to receive through the interlobular veins the blood which has been emptied into the latter from the venules of the hepatic artery. The nutritive blood serves as a substitute, acts vicariously, for the functional. It has been maintained, and the statement passes current in the text-books, that the converse of this is true, viz: that the portal blood can replace the hepatic, the functional act for the nutritive. This view is based on experiments made upon the lower animals. Schiff states that in the cat the functions of the liver are performed just as well after ligature of the hepatic artery as before; and Betz found that in the dog, after tying the trunk of the hepatic and all the collateral branches, no important alteration took place either in the structure of the liver or in its secretion.

Cohnheim and Litten have shown, however, in a very important paper on "Disturbances in the Circulation of the Liver," (Virchow's Archiv. May, 1876), that in experiments on dogs arterial blood still reaches the liver even after ligation of the hepatic, the coronaria ventriculi, and the gastro-duodenalis, owing to the very extensive anastomoses and connections of these vessels. In the guinea pig, on the other hand, the supply of arterial blood can be completely shut off, either from the whole organ or from individual lobes. In the former case the operation is always fatal within 24 hours, and even in this time important changes are found to have to have taken place in the organ. These are all the more marked if, instead of ligating all the arteries, only the one going to the extreme right lobe be tied. The result is an entire necrosis of the portion of the liver supplied by the ligatured artery, and in every instance the animal died within two days.

Cohnheim states that pathological proof of the correctness of this view is as yet wanting, but we are inclined to believe that by this case the deficiency is supplied; for we think the suppuration of the organ best explained on the view, that the shutting off the supply of blood, either by the gradual occlusion of the aneurism by clots,or by the quicker process of emboli conveyed away from the interior of the sac, produced numerous areas of necrosis, which subsequently became, by inflammation and a sequestering suppuration, converted into abscesses. It is impossible to determine, in the absence of any positive evidence, whether the process resulted from emboli or simply by the gradual obliteration of an important blood channel; and in any case there are certain difficulties which will occur to the minds of many in the view which we have suggested. There are at least two cases on record of total obliteration of the artery, without consecutive suppuration, one of which was from aneurism. Still, this, if occurring gradually, and not involving the pyloric artery, need not necessarily, as the above-mentioned experiments prove, deprive the liver of arterial blood. There is no reason to suppose that the obliteration in the case before us did not occur slowly, for the fibrinous laminæ, especially at the anterior end, were firm and tough. Again, on an embolic theory it might be urged that in this instance the emboli, consisting of fibrinous shreds from an aneurismal sac, should have produced simply mechanical effects, infractions, and not, as in the case of emboli proceeding from necrotic or suppurating foci, abscesses. Mechanical emboli do, however, sometimes produce suppuration, and in the liver might do so by causing death of the structures supplied by the obstructed arteries, viz: the portal vessels, bile ducts and connective tissue of Glisson. In the present case, supposing the process to depend on emboli, there would be arterial blood enough sent through collateral branches to furnish material for an active suppuration about the necrotic centres. Altogether, we think the embolic theory meets the case better than any other. We must remember, too, that the disease wm not rapidly fatal, but came on slowly, lasted five weeks or saore, and it is not unlikely that during time that much of

the fibrin was deposited, and the obliteration of the distal end of the aneurism took place. This is rendered still more probable by a consideration of the condition of the left hepatic branch, the commencement of which is involved in the aneurism, but which now, owing to the filling of the proximal end of the sac with fibrin, appears to be almost the direct continuation of the main trunk. In fact, for a short distance from the bifurcation, the upper wall of the left branch is made up of condensed fibrin, which is groved by the blood chanel. This explains, too, the occurrence of the abscesses in the territories supplied by the left branch. The almost entire obliteration of the obtuse end of the sac occurred, most probably after the mischief had been started by the escape of emboli. The appearance of the abscesses adds further support to this view. None of them looked recent or contained shreds of necrotic liver tissue, but all were filled with a creamy pus, and had walls lined by definite pyogenic membranes.

We have no clue to the origin of the aneurism itself. The age of the patient, and the absence of arterial degeneration elsewhere, are almost sufficient to exclude atheromatous degeneration as a cause, and the walls of the sac appear thinned but not evidently diseased. Of other agencies capable of producing aneurism, especially of smaller vessels, embolism is the most important, and, even in the absence of valvular disease, and remembering the unfavorable position of the hepatic artery for emboli, we are inclined to regard it as the most probable cause.