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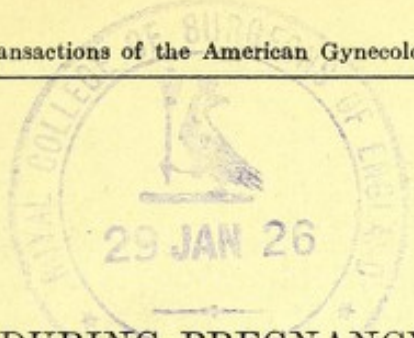
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GALLSTONES DURING PREGNANCY AND THE PUERPERIUM.

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My interest has been recently aroused in the question of gallstones as a complication of pregnancy and the puerperium by the following case, which, on account of the comparative rarity of the condition, will be reported in detail.

Mrs. D. M., aged twenty-seven years, American, was referred to the surgical clinic of the University of Michigan Hospital by Dr. A. N. Howe, of Boyne Falls, Michigan, February 12, 1910. The patient has always been a healthy, hard-working woman with the exception of an attack of pneumonia last winter. Her menstrual periods have been regular, of the twenty-eight-day type, and without pain. She has been married twice, has had six abortions and one full-term child, which lived only a short time after its birth. She is now six months pregnant, having menstruated for the last time August 16th. Life was felt the latter part of December.

PRESENT TROUBLE. Four weeks ago while out walking the patient was suddenly seized with a cramp-like pain in the right side, situated more in the back along the lower rib border. The pain was so severe as to prevent her straightening up, and she had to be helped to the house. That night she became jaundiced. The jaundice has

persisted ever since and is worse than at first. She has vomited frequently, and has lost a great deal of flesh during the past four weeks. She has never been jaundiced before, nor experienced such a pain. The latter has been almost continuous in the right side for the past four weeks, at times becoming almost unendurable. Two nights ago she had a severe attack of nosebleed, and has had two attacks since, so severe that she had to have the nares plugged with cotton.

The day following her admission to the surgical service I was asked to see the patient by my colleague, Dr. de Nancrède, on account of the obstetrical complication. Examination February 14, 1910, showed the patient deeply jaundiced but with very little pain or tenderness in the gall-bladder region. As far as could be ascertained the patient was about six months pregnant, the top of the uterus being at the level of the umbilicus. Fetal movements were to be felt and the fetal heart-beat was 148 and strong.

It was thought best under the circumstances to treat the patient expectantly, hoping to prolong gestation until the child should be viable. But the patient rapidly grew worse, the pain in the back and right side becoming very severe and finally intolerable in spite of large and frequent doses of morphine. February 16th she had a severe chill without a rise of temperature. At this time and up to the operation, seven days later, she vomited almost continuously, and required such large doses of morphine to control the pain as to make it evident that any further efforts to prolong gestation for the sake of the child were unjustifiable.

OPERATION. The operation was performed by Dr. de Nancrède, February 23, 1910, at the urgent request of the patient, who said that she was willing to take any risk rather than longer endure such agonizing pain. There was

no question as to the diagnosis, for besides the symptoms already described, on February 19th the X-ray had revealed the outline of a gall-bladder filled with stones. The coagulation time of the blood was seven minutes, although the patient had been given calcium lactate in large doses since her entrance to the hospital. The gall-bladder was exposed by a vertical incision. It was filled with faceted stones which were removed without difficulty. A number of stones in the common duct were easily crushed, expressed into the gall-bladder, and removed. The gall-bladder was surrounded with gauze and drained. There was considerable oozing during the operation, the hemorrhage being controlled with great difficulty by gauze pressure. Although the entire operation lasted but an hour the pulse rate rose from 90 to 150.

Upon returning from the operating room the patient was given slow saline solution per rectum, each pint containing calcium lactate, one-half dram. During the first sixteen hours after the operation the patient voided but four ounces of urine. She was catheterized, but only a few drops of bile-colored urine was obtained. A hot-air bath was tried, but had to be discontinued on account of difficulty in respiration. The pulse was weak and rapid, and hardy perceptible at the wrist. The dressings were soaked with blood. Salines were administered by hypodermoclysis and strychnine was given freely, but to no avail. She gradually failed and died at 2 P.M. February 24, 1910.

At the autopsy the following day a large amount of clotted blood was found in the peritoneal cavity in the region of the liver and gall-ducts. Two calculi were found in the hepatic duct in such a position that it was impossible to remove them at the operation. There was an acute hemorrhagic nephritis as well.

The autopsy findings furnished by Dr. A. S. Warthin,

from the pathological department of the University of Michigan, are given in detail below:

AUTOPSY. Clinical diagnosis: jaundice; postoperative hemorrhage.

External Examination (General). Build: Length, 163 cm.; frame medium.

Eyes: Conjunctivæ show marked jaundice.

Abdomen: Above level of ribs, particularly lower portion below umbilicus; linea fusca not prominent; linea albicantes over the abdomen and upper part of the thigh.

Surgical wounds: Laparotomy wound 13 cm. long, beginning 9 cm. below tip of ensiform. Runs obliquely down to 2 cm. above umbilicus and to the right 4 cm. The lower part of the wound shows approximated edges, with stitches in position. Upper part contains gauze and a drainage tube. Puncture marks in right arm and below each breast.

Skin: Markedly jaundiced.

Mucous membranes: Marked jaundice

Muscles: Fair.

Rigor mortis: Throughout.

Panniculus: Abundant, particularly over abdomen and thighs.

Edema: Well marked throughout.

Body heat: Cold.

Hypostasis: Marked over back. Scattered blotches over the sides, particularly the thighs. Small subcutaneous hemorrhages over sides and arms.

Putrefaction: No signs.

Orifices: Negative.

Nose: Negative.

Genital: Vagina packed with cotton, slightly bile-stained.

Thorax and Abdomen (Main Incision). Panniculus: On section pale, lemon yellow, and moist.

Abdominal cavity: No fluid.

Omentum: Adherent about edges of wound.

Position of abdominal organs: Uterus fills the lower part of the abdomen, rising on the right about two fingers' breadth above the level of the umbilicus. Liver two fingers' breadth below ensiform and two fingers' breadth above rib border in right nipple line. Spleen and stomach in normal position. No evidence of inflammation of the abdominal wound.

Position of diaphragm: On left, fourth intercostal space. On right, fifth rib.

Mammæ: Large. On pressure, a whitish, creamy fluid from nipples.

On section show active secretion.

Costal cartilages: Tissues about breast are edematous.

Sternum: Negative.

Thorax. Anterior mediastinum: Fat abundant. Edematous. Small congested lymph nodes.

Thymus: Fat abundant. No visible remains of gland.

Pericardium: Sac lax. Fluid not increased. Clear, slightly bile-stained.

Heart: Weight, 240 grams; length, 12 cm.; breadth, 10 cm.; thickness, $4\frac{1}{2}$ cm. Apex, fourth intercostal space in parasternal line. Flabby, soft. Ventricles dilated. Contain small quantity of fluid blood without clots, thin and watery, small. Epicardium negative. Subepicardial fat abundant. Serous. Slight fatty degeneration of heart muscle.

Left heart: 8 to 12 cm.

Cardiac orifices and valves: Mitral admits two fingers. Slight nodular thickening of proximal edges of mitral. Tricuspid admits three fingers. Valves negative.

Left lung: Weight, 310 grams; length, 18 cm.; breadth, 12 cm.; thickness, 4 cm. No fluid or blood in either thoracic cavity. Old adhesions easily torn. Firmly

adherent over base. Rather collapsed hypostasis in lower lobe. Slight antenacosis. Moist. No airless areas. Moderate rich blood content. Bronchial nodes small. Hyalin scars in larger bronchial nodes. Old healed tubercles.

Right lung: Weight, 380 grams; length, 20 cm.; breadth, 12 cm.; thickness, 5 cm. Few adhesions. Moderate congestion and edema. Slight antenacosis. Posterior portion hypostatic. Number of heavily pigmented nodules, old healed tubercles on posterior upper and middle lobes. Otherwise similar to left.

Bronchi: Mucosa of larger bronchi slightly injected.

Bronchial glands: Recent tubercle in one gland on right side.

Pulmonary vessels: Aorta admits thumb. Valves negative. Slight degeneration of aorta.

Thoracic portion of esophagus: Thoracic and abdominal aorta show beginning degeneration.

Abdomen. Spleen: Weight, 300 grams; length, 15 cm.; breadth, 9 cm.; thickness, 4 cm. Lower pole covered by a blood clot the size of one taken from flank. Large, rather soft. Flattens on table. Capsule shows a few small adhesions. Deep anterior and posterior fissures. On section, pulp purplish, soft, bleeds freely, covers up stroma, follicles not visible. Acute passive congestion.

Left adrenal: Both adrenals surrounded by edematous fat. Both enlarged, thickened and suffused.

Left kidney and ureter: Weight, 150 grams; length, 12 cm.; breadth, 7 cm.; thickness, 3 cm. Ureters not dilated. Fatty capsule abundant; bile-stained. Fibrous capsule strips easily. Very soft, plump, flattens on pressure. Surface icteric, cloudy, moderately congested. Marked cloudy swelling.

Right kidney and ureter: Cortical surface much more mottled, plump, soft, shows fetal lobulation. Patches of

fatty degeneration and hemorrhage. On section, acute parenchymatous degeneration; hemorrhagic nephritis.

Bile passages: Contain thin, watery, cloudy fluid. No blood. Pressure on common duct above and in region of gall-bladder causes erection of ampulla with discharge of thick, brownish fluid. In opening of duct is a small stone, partially blocking it. Stone the size of a small pea. On separating the hepatic flexure from the gall-bladder at the site of the wound clots are found filling in the space beneath the under surface of the liver. Whole site of the operation covered with clot which is adherent more firmly about the ligatures. No rupture of the liver. No escape of intestinal fluid. Retroperitoneal tissues soft and friable and infiltrated with blood. Main source of hemorrhage from an opening above the kidney. Marked edema back of ascending colon and cecum. Also numerous blood clots throughout retroperitoneal fat tissue.

Liver: Very soft, icteric, cloudy, marked cloudy swelling and some fatty degeneration. In common duct fragments of pigment and cholesterin stones. In hepatic ducts two faceted stones, fragments, and sand.

Gall-bladder: Wall thickened, edematous. Mucosa is intact over large portion, thickened and not filled with blood, common, hepatic and cystic ducts dilated and thickened.

Retroperitoneal lymph nodes: Congested, hypoplastic.

Rectum: Pelvic tissues almost bloodless. Very little edema.

Vulva: Labia swollen and darkened.

Uterus: Uterus fills in lower portion of abdomen, slightly higher on right than on left, rises on right two finger's breadth above the umbilicus. The upper pole is slightly depressed in the middle, giving the fundus a slightly bicornate appearance. Serosa negative, no abnormal adhesions. Palpation reveals the presence of a

fetus, the head and extremities of which can be easily felt through the wall. The head is in the lower right portion with the occiput anterior. The placenta was upper left posterior. Weight of uterus, 3300 grams; $27\frac{1}{2}$ cm. x 22 cm. x 9 cm. The uterus was opened in the median line and found to contain a male fetus in the late sixth or beginning seventh month. According to the measurements a six and one-half months' fetus.

Fetus: Measurements. Length, 37.5 cm.; bisacromial, 8.5 cm.; bitrochanteric, 7.3 cm.; cord, 50 cm.; finger nails, 0.3 cm.; bitemporal, 7 cm.; occipitomenal, 11 cm.; occipitofrontal, 10 cm.; parietal bones, cartilaginous plates, ossified in centre.

MICROSCOPICAL AND BACTERIOLOGICAL FINDINGS. Heart: Heart muscle shows slight hypertrophy, slight cloudy swelling and fatty degeneration, slight increase in fat tissue in epicardium.

Lungs: Passive congestion. Localized emphysema. Edema. Numerous emboli of bone marrow, giant cells, and syncytial giant cells. Smaller bronchioles dilated; small patches of beginning bronchopneumonia.

Liver: Passive congestion, icterus, cloudy swelling, simple necrosis of the central zones of lobules, some peripheral infiltration; dilatation of larger bile ducts.

Spleen: Acute passive congestion.

Kidneys: Marked cloudy swelling, congestion. Icterus. Right kidney shows recent metastatic abscesses and the nephritis is much more marked. Subacute parenchymatous nephritis. Numerous areas of marked purulent infiltration.

Right adrenal: Shows a thrombus in the adrenal vein with a hemorrhagic anemic infarction of the greater part of the organ. Extensive periadrenal hemorrhage. The blood clot free in the peritoneal cavity is a recent red clot.

Intestine: Postmortem change and passive congestion.

Mammary gland: Shows early stage of secretion.

Gall-bladder wall: Shows marked edema, hemorrhage and recent infiltration; organizing blood clot on the surface. Colonies of colon bacilli in veins and lymphatics.

Pancreas: Shows a marked chronic interlobular and interacinar pancreatitis with dilated ducts. The islands of Langerhans are greatly diminished in number.

Uterus: Sections through the uterine wall at the placental sight show a normal placenta about seventh month. The blood spaces are collapsed and the intervillous spaces contain very little blood except toward the deeper portion of the chorion and decidua. No pathological changes in chorion, decidua or uterine wall. Sections of uterine wall and amnion at other places show no pathological changes.

Tissues of Fetus: Thymus: Large, congested, the medulla unusually prominent.

Spleen: Congested, rather poor in lymphoid cells.

Liver: Shows slight cloudy swelling and fatty degeneration, otherwise entirely normal.

Heart: Muscle normal.

Kidneys: Show cloudy swelling of the convoluted tubules, and the glomeruli are unusually congested. The tubules just beneath the capsule particularly show cloudy swelling. No bile casts are found in the collecting tubules and no trace of bile pigment in the kidney.

Lungs: Atelectatic, entirely normal.

Stomach and intestines: Show no pathological changes.

Bladder: Is negative.

Adrenal: Shows no pathological changes.

Lymph glands: Negative.

Testis: Normal.

Umbilical cord: Normal.

Chemical tests for bile in amniotic fluid entirely negative.

No trace of bile found in fetus.

Considering the frequency with which gallstones are met with in women, it is rather surprising to find so few cases recorded in the literature where this complication has given rise to symptoms during pregnancy or the puerperium. Ehrenfest in Peterson's *Obstetrics* mentions the subject briefly in the chapter on the complications of pregnancy; Jardine, in his *Clinical Obstetrics*, 1909 edition, says that while gallstones undoubtedly occur during pregnancy, he has never seen a case. With these exceptions, as far as I can find, this complication is not mentioned in English or American text-books on obstetrics. Schauta and P. Müller dismiss the subject with a few lines, and the same may be said of v. Winckel's more pretentious *Handbuch der Geburtshülfe*. In Vineberg's excellent article, in which he reports two cases of cholecystitis operated upon during the puerperium, he states that a careful search through the literature of the past ten years yielded only four similar cases. For the purpose of studying this complication during pregnancy and the puerperium, I have collected and tabulated twenty-five cases of gallstones complicating pregnancy, including the case reported above and ten cases of this complication during the puerperium. These cases have been classified under pregnancy and the puerperium as warranted by their prominent symptoms, although it is perfectly evident that a gallstone attack might complicate pregnancy and be terminated spontaneously or by operation during the puerperium or *vice versa*.

Cases of empyema of the gall-bladder without stone or attacks of biliary colic where the diagnosis was not proved correct either by operation or through finding the calculi in the stools have been excluded. Otherwise it would have been possible to gather statistics from a much larger number of cases, since Huchard collected twenty cases of biliary colic during pregnancy and the puerperium, and

Berline-Héring fifty-one similar cases. The same may be said of the cases of Naxera. In none of these was it proved that the attacks were due to gallstones.

Age: Gallstones are rarely found under the age of twenty, although they have been reported in the new-born and in young children. Shroeder says "that under the age of twenty the percentage is 2.4; from twenty to thirty, 3.2; from thirty to forty, 11.5; from forty to fifty, 11.1; from fifty to sixty, 9.9; and over sixty, 25.2 per cent." Naturally such figures will depend upon the manner in which such statistics are collected. Operative statistics will show the presence of gallstones when the symptoms of cholelithiasis made the operation imperative, but will give no information as to the length of time the calculi have been in the gall-bladder. Even the attempt to estimate the first appearance of the stones from the history of attacks of biliary colic is apt to prove futile, for the calculi may have been in the gall-bladder for a long time without giving rise to symptoms. Hartman, Moynihan, and Ochsner have endeavored to estimate the period of the onset of stones in the gall-bladder from the histories taken just before the operations were performed. The estimates vary from twenty-eight to thirty-eight years of age. Bouchard asserts that in women biliary lithiasis is most common between twenty-five and thirty-five years of age, in four-fifths of the cases the first attack occurring between the ages of seventeen and forty-two; in the remaining one-fifth of all cases it occurs after the age of fifty.

In the twenty-five cases of gallstones complicating pregnancy, the ages of the patients were recorded in twenty-one instances. They may be arranged as follows:

Ages of Patients where Gallstones Complicated Pregnancy.

Between 20 and 25 years.....	4 cases.
Between 25 and 30 years.....	8 cases.
Between 30 and 35 years.....	6 cases.
Between 35 and 40 years.....	3 cases.
	—
	21 cases.

Youngest patient, 21 years.

Oldest patient, 37 years.

The ages of the patients suffering from gallstones during the puerperium were mentioned in seven instances, as follows:

Ages of Patients where Gallstones Complicated the Puerperium.

Between 20 and 25 years.....	3 cases.
Between 25 and 30 years.....	1 case.
Between 30 and 35 years.....	1 case.
Between 35 and 40 years.....	1 case.
Over 40 years.....	1 case.
	—
	7 cases.

Youngest patient, 20 years.

Oldest patient, 46 years.

In nine cases occurring during pregnancy the patients had had previous attacks, the latter antedating the pregnancies all the way from one to twelve years. It would be impossible to estimate from such a small number of cases the dates of the onset of the gallstones. Yet the histories are interesting, for in some instances the patient had had similar attacks with preceding pregnancies, resulting in Villard and Gélibert's patient in a miscarriage in the preceding gestation.

In one of Goldammer's cases where a cholecystotomy was performed one month after a miscarriage at the fourth month of the seventh pregnancy, the patient had suffered from attacks of biliary colic ever since her first pregnancy.

Sex: It has been established beyond dispute that gall-

stones are more common in women than in men. Schroeder finds that in Germany they are found in 20 per cent. of female and 4.4 per cent. of male necropsies. In the Manchester Royal Infirmary in 228 autopsies in women and 524 in men, 7.9 per cent. of the females and 2.9 per cent. of the males were found to have gallstones.

In fifty cases of gallstones Ochsner had four times as many in females as in males. In Kehr's series of 720 laparotomies upon 655 patients, performed from 1890 to 1892, there were 536 women and 119 men.

There would seem to be good reason for thinking that pregnancy, labor, and the puerperium may account for the frequency with which gallstones or disease of the gall-bladder and bile-ducts are met with in women. This is not the place to discuss this question at length, only to state that anything favoring the retention of bile within the gall-bladder is undoubtedly a factor in the formation of calculi. Bile remains sterile only so long as there is no obstruction to its onward flow. It has been shown experimentally that infection follows obstruction caused by ligation of the common duct. Infection of the bile favors the formation of calculi. It can readily be seen that the enlarging pregnant uterus is only too apt to encroach upon the bile-passages, thus interfering with the onward flow of the bile. This also is undoubtedly favored by the limitation of the movements of the diaphragm during pregnancy, the lack of exercise only too common in the pregnant state and the constipation with which the parturient woman is affected.

According to Schroeder's statistics 90 per cent. of the women who had gallstones had borne children. It is no unusual occurrence for the surgeon during the course of an operation for some abdominal or pelvic lesion to find one or more calculi in the gall-bladder. For some years past, in addition to a careful examination of the appendix,

I have palpated the gall-bladder, whenever danger of contamination of healthy peritoneum from a purulent focus elsewhere or the condition of the patient did not contraindicate such a procedure. In order to throw some light on the influence of pregnancy upon the formation of gallstones, I have looked up the records of 532 women where the gall-bladder was palpated as an incident to some other abdominal operation. My findings are as follows:

Gall-Bladder Palpated During the Course of Abdominal Operation.

Number of patients where gall-bladder was palpated..	542	
Number of patients having gallstones.....	64	11.8%
Number of patients with gallstones who have had children	48	75 %
Number of patients without gallstones.....	478	
Number of patients without gallstones who have had children	314	65.7%

These figures show that a surprisingly large number of women (11.8 per cent.) who apply to the gynecologist for the relief of conditions outside of the liver are found at operation to have gallstones. Going back over the histories after locating the gallstones, I find that in a certain proportion of cases the stones were suspected. Still the main lesion in every instance was situated outside of the gall-bladder. What the same number of abdominal operations in men would reveal as regards the gall-bladder I have no means of knowing.

These statistics are taken from a strictly gynecological clinic in a general hospital and in a private hospital service almost as strictly gynecological. With a different kind of material they very well could vary greatly. Only 75 per cent. of the sixty-four patients with gallstones had borne children, quite a variation from Schroeder's 90 per cent. To make these figures of value, as far as the influence of pregnancy upon the formation of gallstones was concerned, it became necessary to ascertain the proportion of women

without gallstones who had borne children. This percentage was 65.7 or practically 10 per cent. less than in the women who had the gallstones. A larger number of cases might change these figures considerably, although I judge not a great deal, since pregnancy and the puerperium are undoubtedly not the only factors giving rise to gallstones in women.

In the twenty-five cases where the pregnancy was complicated by gallstones, the period of gestation when the attack first appeared was recorded in twenty cases, as follows:

Attacks prior to pregnancy.....	2 cases.
First appearance during first month	2 cases.
First appearance during second month.....	3 cases.
First appearance during third month	2 cases.
First appearance during fourth month.....	1 case.
First appearance during fifth month.....	7 cases.
First appearance during seventh month.....	1 case.
First appearance during the eighth month.....	1 case.
First appearance during labor.....	1 case.

In the ten cases complicating the puerperium the time of onset was recorded in nine cases, as follows:

First appearance during labor.....	1 case.
First appearance during first week of puerperium.....	5 cases.
First appearance during ninth day of puerperium.....	1 case.
First appearance during tenth day of puerperium.....	1 case.
First appearance during third week of puerperium.....	1 case.

In the pregnancy cases it is significant that in nearly one-third of the patients the onset of this attack is at the period of gestation when the uterus is approaching the level of the umbilicus, when as an abdominal organ it is beginning to crowd the intestines toward or upon the bile-passages. If 11 per cent. of all women have gallstones a certain proportion, as far as their biliary passages are concerned, may be said to be in a state of unstable equilibrium.

Such women will be subject to attacks at about the fifth or sixth month of gestation when the growing fetus is beginning to hamper the eliminative powers of the liver. This tendency is enhanced by injudicious use of the corset in attempts to conceal the size of the abdomen and the increase in the sedentary habits of the patient.

In the puerperium it is to be noted that in half the cases the attacks occurred during the first seven days postpartum. This may be explained by traumatism to the biliary passages during labor, to the great eliminative processes going on at this period, to the change in intra-abdominal pressure, and, finally, to the enforced rest in bed with its attendant constipation (Vineberg).

Chills and Rise in Temperature: During pregnancy complicated by gallstones there were chills followed by a rise in temperature in six cases. In the case reported above there were chills but no elevation of temperature. In three of the cases there was jaundice, and in these instances pus was present in the gall-bladder or common duct. In only three instances were chills and increased temperature associated with jaundice. In six cases there was fever without chills. In two puerperal cases chills were recorded, both associated with fever, but neither with jaundice.

Jaundice and Location of Gallstones: This is a particularly interesting symptom of cholelithiasis in the pregnant woman, since icterus undoubtedly has a tendency to start up uterine contractions. Thus whether due to obstruction in the common duct or to changes in the liver cells, icterus whether acute or chronic, is a constant menace to the fetus. The nearer gestation approaches full term the greater is the danger of interrupting pregnancy. In some cases the placenta does not serve as a barrier to the passage of the maternal bile, so that nutritional and other changes are apt to follow its absorption into the fetal tissues. Finally every case of icterus in the pregnant woman may cease to

be benign and assume the malignant type, represented by acute yellow atrophy of the liver.

Among the twenty-five pregnant cases tabulated, fifteen had jaundice in varying degrees of intensity, a surprisingly large number, since Kehr states that in 80 to 90 per cent. of his cases jaundice was absent where calculi were lodged in the gall-bladder or cystic duct. Even in common-duct stones it was absent in one-third of the cases. The location of the stones where the jaundice was present is as follows:

Jaundice and Location of Gallstones.

Calculi in gall-bladder	7 cases.
Calculi in common duct	4 cases.
Calculi in common duct and gall-bladder.....	1 case.
Calculi in common duct, gall-bladder, and hepatic duct..	1 case.
Calculi in stools	2 cases.

Thus jaundice existed in fully one-half of the cases where the calculi were limited to the gall-bladder, and in 100 per cent. of the cases where the common duct alone was the seat of the gallstones. It would appear as if this high percentage of jaundice where pregnancy is complicated by gallstones can only be explained by the tendency of pregnancy to produce jaundice in a constitutional way without the aid of obstruction in the shape of calculi.

There was only one case of jaundice among the puerperal cases, the stones in this case occupying the gall-bladder and the common duct.

Operation. Of the twenty-five cases of gallstones during pregnancy, twenty-three were operated upon with three deaths, or a mortality of 13.04 per cent.

Operations Upon Twenty-three Cases of Gallstones During Pregnancy.

Total number of cases	25
Number of operations	23
Number of deaths	3
Operative mortality	13.04 per cent.
Recovery without operation	2

Of the ten puerperal cases, nine were operated upon with one death, a mortality of 11.1 per cent.

Operations Upon Nine Cases of Gallstones During the Puerperium.

Total number of cases.....	10
Number of operations	9
Number of deaths	1
Operative mortality	11.1 per cent.
Recovery without operation	1

Three deaths out of twenty-three cases operated upon during different periods of gestation for biliary calculi where from the nature of the case the operation would only be performed because of urgent indications is certainly a very good showing. The number of operations, even if those performed upon the puerperal cases be included, is too small for sweeping deductions, since many factors contribute to a fatal ending in gallstone operations. Chief among these is the position of the stone, since the mortality is considerably higher after removal of stones from the common and hepatic ducts.

The location of the stones is indicated in the following table:

Location of Stones in Twenty-five Cases of Cholelithiasis During Pregnancy.

Calculi in gall-bladder	14 cases.
Calculi in common duct	4 cases.
Calculi in gall-bladder and common duct	1 case.
Calculi in gall-bladder and cystic duct.....	1 case.
Calculi in common and hepatic ducts.....	1 case.
Calculi in gall-bladder, cystic duct, and common duct..	1 case.
Calculi in gall-bladder, common duct, and hepatic duct..	1 case.
Calculi in stools	2 cases.

All of the common-duct cases recovered except the present case, where the stones were located not only in the common duct, but in the gall-bladder and hepatic duct as well. The fact that the patient was pregnant had very

little to do with the fatal result in this case, for the patient died from uncontrollable hemorrhage, arising from the lessened coagulability of the blood brought about by the intense icterus. The same result is occasionally met with in the non-pregnant patient.

Rhett's fatal case was operated upon in 1888, when the technic of gall-bladder surgery had not been perfected. Labor came on soon after the operation, and the patient died later of peritonitis. It is probable that under modern aseptic surgical methods the patient would have survived.

The third death, reported by Roith, resulted from a cholecystotomy for an infected gall-bladder containing pus and stones.

For the sake of completeness the location of the gallstones in the puerperal patients will be appended below, although the operative results differ very little from the pregnancy cases.

Location of Gallstones in Ten Cases of Cholelithiasis During the Puerperium.

Calculi in gall-bladder	6 cases.
Calculi in cystic duct	1 case.
Calculi in gall-bladder and common duct.....	1 case.
Rupture of gall-bladder and escape of calculi.....	1 case

The only fatal case in this series, that of Rose, was unavoidable, since death resulted from rupture of an empyema of the gall-bladder with escape of gallstones into the peritoneal cavity. Death resulted within three days in spite of the operation.

Period of Gestation when Operations were Performed.

It is essential to consider the period of gestation when the operations were performed, for this has a distinct bearing upon the results of operations performed upon pregnant patients. The nearer the operation is to full term the greater will be the chances of interrupting the pregnancy, hence the greater the possibilities of sepsis outside of that

resulting from the operation itself. This is shown by a study of such operations as appendicitis and the removal of ovarian or fibroid growths during pregnancy. In gall-bladder disease we have an added factor in the icterus, which, as has been stated, has a tendency to increase the irritability of the uterine muscle. The presence of pus and the rise in temperature, which usually accompanies it, are not inconsiderable factors in the production of miscarriage.

Time of Operation in Twenty-five Cases of Cholelithiasis during Pregnancy.

Month of gestation.	No. of Cases.	Went to full term.	Aborted.	No statement made of pregnancy after operation.
Second	2	2		
Third	3	1		2
Fourth	1			1
Between fourth and fifth..	1			1
Fifth	6	3	1	2
Sixth	2	1		
Between sixth and seventh.	1	1		
Seventh	1	1		
Eighth	1		1	
Tenth	1		1	1
	—	—	—	—
	19	9	3	7

Operations performed after miscarriages.....	2
Operations performed after full-term deliveries.....	2
Death after operation, fetus undelivered.....	1
Cases not operated upon.....	2

By consulting the above table it will seen that of the nineteen cases operated upon during the different months of pregnancy nine went to full term, two aborted, one died before the uterus was emptied, and in seven no statements were made of the progress of the pregnancy after the operation. It is fair to assume, however, that this was an oversight on the part of the reporters, it being taken for granted that as this was not mentioned the patient

went to full term. If this be true, we have sixteen patients where the pregnancies were not interrupted, against three who aborted, the operations being performed at various periods of gestation. In addition, two aborted before the operations were performed. Such a showing means that pregnancy is no more liable to be interrupted after gallstone than after other abdominal operations.

The technical difficulties of operations upon the biliary passages are increased the more advanced the pregnancy, owing to the proximity of the enlarged uterus to the field of operation. The necessary manipulation of the uterus in exposing the biliary passages adds to the liability of miscarriage, as is shown by the fact that of the three interruptions of pregnancy resulting from the operations there was one each in the fifth, eighth, and tenth month of gestation. However, the dangers of miscarriage would not seem to be much greater after gallstone operations than other abdominal operations the surgeon is called upon to perform upon the pregnant patient. In fact, it would appear as if, in gallstone disease complicating pregnancy, the latter condition should be disregarded and the patient treated according to the gallstone indications. This possible exception to this rule would be that the surgeon would naturally lean toward conservatism as regards operation, especially where the fetus is not yet viable. It is not unlike the situation in extra-uterine pregnancy. Prompt operation is advisable in the early months of gestation. If, however, the fetus has escaped destruction in the early months of its existence, it should be given a chance for its life, the mother being kept under constant surveillance, so that the operation can be performed at any time.

As far as the danger to the mother is concerned, a question of far greater moment is the type of operation to be selected. On account of the well-known tendency of

general anesthesia to interfere with the eliminative functions of various organs, notably the liver and kidneys, it is of the highest importance to choose the operation which can be performed in the shortest possible time consistent with the existing conditions of the biliary passages. In this way not only will the pregnant patient, perhaps already more or less toxic from faulty elimination, be spared a long anesthetic, but the pregnant uterus will escape extensive exposure to the atmosphere and protracted handling.

Time of Operation in Nine Cases of Cholelithiasis During the Puerperium.

Operation ten hours after labor.....	1 case.
Operation second day after uabor.....	1 case.
Operation tenth day after labor.....	1 case.
Operation eleventh day after labor.....	1 case.
Operation twelfth day after labor.....	1 case.
Operation five weeks after labor.....	2 cases.
Operation five months after labor.....	1 case.
Operation, definite time not stated	1 case.

As has been stated, all of these operations were successful with one exception.

Nature of Operation: Of the twenty-three patients subjected to operation for cholelithiasis complicating pregnancy, cholecystotomy was performed in fifteen cases, with two deaths, and cholecystectomy in six cases with one death. In one instance a stone in the common duct was removed through the duodenum, and in one case the nature of the operation was not stated. In the nine patients where gallstones were a complication of the puerperium, there were seven cases of cholecystotomy with one death, cholecystectomy one case with recovery and one case where the nature of the operation was not stated.

Interruption of Pregnancy: In the twenty-five cases of gallstones during pregnancy the latter was interrupted in five instances, two before and three after the operation.

In Goldammer's case of operation after an abortion at the fourth month of the seventh pregnancy, the patient had had attacks of biliary colic since her first pregnancy. She aborted during a very severe attack of pain, in spite of the fact that the gallstone colic was unaccompanied by chills, fever or jaundice. In Alexander's case of abortion prior to the operation at the sixth month of gestation, the high fever, rapid pulse, and chills undoubtedly accounted for the premature labor pains.

The three miscarriages after operation, as before stated, were at advanced stages of gestation, and in each instance were preceded by high fever and jaundice.

Diagnosis: Neither during pregnancy nor the puerperium will there be any difficulty in diagnosing gallstone disease if the attacks are typical. By this is meant if the pain be sharp and located in the right hypochondrium, if there be localized tenderness, fever, chills, and especially jaundice. This latter symptom is very suggestive of biliary lithiasis, but is only present in a certain proportion of cases, even where the calculus is lodged in the common duct.

Mistakes have been made by the most competent observers. Thus in Potocki's case the attack during pregnancy was confounded with appendicitis. Where the pain of the gallstone colic is atypical, and the tenderness quite general, it is easy to understand how such a mistake could be made.

Rose's case of rupture of the gall-bladder during the second stage of labor might easily be confounded with rupture of the uterus. In both there would be sudden pain, shock, and collapse. One would have to depend upon the absence of any obstetric condition capable of producing uterine rupture rather than upon symptoms common to the two conditions.

Goldammer was led to think from an atypical swelling

between the kidney and liver that he had to deal with a hydronephrosis. A lumbar incision showed a normal kidney and biliary calculi, which were afterward removed by an abdominal incision.

In the puerperium the diagnosis of gallstones may be even more difficult and confusing, since the chills, fever, and abdominal pain at once suggest septic infection. Pinard made this error in a case of gallstone disease following a forceps delivery. Although the attack started on the third day postpartum, the true nature of the disease was not recognized and the operation not performed until the tenth day of the puerperium. In both of Vineberg's cases the medical attendant mistook them for sepsis until the diagnosis of cholecystitis was established by operation.

Sitzenfrey mistook a very movable tumor of the gall-bladder in which the liver dulness did not extend downward to the mass for an ovarian cyst fixed in this region by adhesions.

However, by bearing in mind the possibility of cholelithiasis in pregnancy and the puerperium, the diagnosis in the ordinary case ought not to be very difficult.

CONCLUSIONS.

1. Gallstones are most commonly met with in women between the ages of twenty and thirty-five.
2. Gallstones are more common in women than in men.
3. There are reasons for thinking that childbearing has something to do with the frequency of gallstones in women.
4. This was borne out by finding that in 542 patients where the gall-bladder was palpated during the course of abdominal operations, gallstones were found to be present in sixty-four, or 11.8 per cent.
5. The percentage of patients with gallstones who had borne one or more children was 75, as against 65.7 per cent. in women who had no gallstones.

6. In the present series of pregnant patients with cholelithiasis, in nearly one-third of the cases the onset of the attack was at the fifth month of gestation, or at the time when the uterus is approaching the level of the umbilicus and beginning to crowd the intestines toward or upon the bile-passages.

7. In the puerperal cases the onset of the attack in one-half of the cases was during the first seven days post-partum.

8. Chills with elevation of temperature associated with jaundice are frequent in gallstones complicating pregnancy and the puerperium.

9. In the series studied there was a surprisingly large percentage of pregnant patients with jaundice, fifteen out of twenty-five, or 60 per cent.

10. Only one out of the ten puerperal patients had jaundice.

11. The operative mortality for the twenty-three pregnant patients was 13.04 per cent.

12. The operative mortality for the puerperal cases with cholelithiasis was 11.1 per cent.

13. In the pregnant patients with cholelithiasis more than one-half of the stones were in the gall-bladder alone. The same may be said of the puerperal cases.

14. It is probable that there is no greater tendency for gallstone operations to interrupt pregnancy than is the case with other abdominal operations during various periods of gestation.

15. It is advisable when cholelithiasis complicates pregnancy and the puerperium to choose the operative procedure, which can be performed in the shortest possible time consistent with the existing conditions.

16. The condition of the pregnant patient as regards the cholelithiasis should be the determining factor as to when the operation should be performed. Whenever

possible the operation should be postponed until the child is viable.

17. The diagnosis of cholelithiasis during pregnancy and the puerperium will not be difficult in typical cases if the possibility of the complication be borne in mind. Much reliance can be placed upon the jaundice which seems to be more prevalent in pregnant than in non-pregnant women with gallstones.

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