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"Gallstones" - "Their etiology, Physical character, Pathology Symptoms & Treatment"

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"— Gallstones, their etiology - physical characters, Symptoms & treatment —"

Etiology. Different authorities vary considerably in their estimates of the value of certain conditions in favouring the formation of Gallstones Most are agreed that they occur more frequently in females than in males von Schnueppel[1] thinks this may be due entirely to their more sedentary mode of life and to the use of corsets — Naunyn[2] lays considerable stress on the occurrance of pregnancy & says that 90% of women who suffer from Gallstones have borne children, while Geo Harley[3] finds the explanation in the greater obesity & less active life of women. Middle & advanced age furnish the majority of cases of Gallstones von Schnueppel[1] says age renders the Bile passages more tolerant of solid bodies & favours stasis of the Bile, giving therefor a longer period of rest for the growth of the calculi; according to the same author, age, furnishes more precipatable substances to the Bile especially Cholesterin, this last is more abundant in proportion to the increase in retrograde metamorphosis taking place in the body.

It has been suggested by Morris[4] that a right moveable Kidney drags down the Duodenum & Bile ducts, & thus prevents the proper emptying of the Gallbladder & ducts & so favours gallstone formation —

Brockbank[5] suggests that depression of the Anterior part of the right lobe of the Liver depresses the Fundus of the gallbladder & favours precipitation in that site — It will be noted in

this connection that tight-lacing is a frequent cause of the displacements of the liver referred to, he further states that if gallstones occur in a patient under 30 years of age, it will be found that a cardiac lesion is present; this was so in each of 8 cases examined by him, he explains this by a greater degeneration of the cells thro' asphyxia –
Gallstones are particularly common in stout people who consume large quantities of rich saccharine & greasy foods & alcohol & who at the same time lead sedentary lives, this very probably is not due to a direct connection between a special diet & stoutness & gallstones; but merely to the fact that such a diet both produces obesity & disturbs the digestion & the secretion of bile – While warm climates are also liable to cause hepatic derangements they do not seem to furnish an excessive number of cases of Cholelithiasis, in fact some authors say that Gallstones are excessively rare in such countries & explain the fact by an abnormally free flow of Bile –
The middle & upper classes are specially liable to suffer from gallstones, but this is probably to be explained by the more active habits of the working classes, prolonged bodily rest interfering with the flow of Bile
According to Murchison[6], gallstones are often associated with gout, asthma, urinary gravel, neuralgia, megraine urticaria etc. Such a condition as gout should not however be regarded as a cause of gallstones, the real

relation is that the two have a common origin in such conditions as greater age, less active bodily habits, better circumstances, richer diet etc etc. in the same way corpulence is not a cause but results from the same faults as do gallstones Conditions which retard or arrest the flow of Bile have an important influence on the development of gallstones, among these must be included the allowing too long intervals between meals, when this happens the Bile is at rest & any precipitants that may be present have time to form themselves into concretions; Sedentary habits leading to prolonged bodily rest also interfer with the flow of Bile — Various anatomical changes in the Liver & Bile ducts render the excretion of Bile more difficult eg. Tumors pressing on the biliary passages, atnomal depression of the Liver or Duodenum, while an inflammed or degenerated gallbladder or one fixed by adhesions has its contractions rendered difficult or impossible. With regard to catarrh of the gallbladder & passages it is to be remembered that while on the one hand gallstones cause catarrh, on the other hand catarrh favours the development of gallstones, it more or less paralyses the gallbladder, narrows the ducts & retards the flow of bile — catarrh may also be said to produce chemical alteration in the Bile especially rendering it more nearly acid Again catarrh produces masses of mucus which and

flakes of epithelium which may form the nuclei of calculi
Obstruction as pointed out by Waring. while generally
present ~~it~~ is not by itself sufficient to account for the
formation of Gallstones, the starting cause seems sometimes
to be an inflammation of the mucous membrane of the ducts
& gallbladder caused by the Bacterium Coli Commune
this Bacillus while always present in the Intestines is said
to gain access to the Biliary passages either :-
(1) when the flow through them is retarded & the Bacillus
~~be~~ being slightly motile or
(2) by the backward peristalsis forcing faeces into the
duct when there is pressure on the lower part of the
Duodenum as by tight lacing, or obstruction to the onward
passage of faeces in the Colon. — If these micro-organisms
gain access to the Bile ducts they may pass into the
Hepatic ducts, but pass more easily into the gallbladder
since during the intervals between digestion their
ascent is made more easy by the Bile passing up the
Cystic duct into the gallbladder — In the gallbladder
& ducts the Bacilli produce irritating Chemical
substances (toxins or ptomaines) which cause an
inflammatory condition of the epithelial cells of the part
the metabolic processes of these cells are are so modified
that their interior becomes occupied by Myelin like
masses that are extruded on the surface of the

mucous membrane, crystallise & form cholesterine masses or clumps, ẽ cholesterine crystals are deposited on the surface & so a calculus begins to form – the cholesterine so deposited on the surface may come either from that which is in solution in the Bile & may be some of the small masses of cholesterine extruded from the epithelial cells.

It has been suggested by Sherrington[8] that the micro-organisms enter by the Portal Vein & that their toxins having damaged the protecting Hepatic tissue - pass thro to the Bile ducts. The Bacterium Coli Commune is not however the sole exciting cause of these changes in the mucous membrane it has been noted that Typhoid Fever is not infrequently followed by the formation of Gallstones, in such cases the Bacillus of Eberth is present in the ducts & Gallbladder & sets up an inflammatory condition which results in seperation of Cholesterine & formation of Calculi, in such cases the interior of small calculi have been found to contain Eberths Bacilli – further the Streptococci & Staphylococci of suppuration have also been found in the Bile in cases of Cholelithiasis –

a deminished quantity of Bile acids in the Bile has been supposed to have some connection with the formation of Gallstones – Bile acids help to keep Cholesterine in solution, there is said to be a

tendency for gallstones to form when (1) the Bile acids are deminished in quantity, as is occurs when the diet is non nitrogenous. & (2) when Cholesterine is increased as in Catarrh of the Bile ducts & gallbladder

Not infrequently foreign bodies have been found to be the nucleus of gallstones & apparently to have some relation to their formation; among these have been steel needles, round worms, plugs of mucus, Liverflukes, bloodclots collections of Bacteria & crystals of Calcium carbonate. according to Mignot[9] if the gallbladder be aseptic the foreign body does not cause cholelithiasis, but if the viscus be infected with an attenuated microbe cholesterine crystallises out & is deposited on the surface of the foreign body —

Composition & Physical Characters of Gallstones

The number of gallstones that may be found, according to Von Schuepfel[1] varies greatly — from one to several hundreds. Frerichs[10] counted 1950 but Otto seems to hold the record in a case in which 7,802 were found in the gallbladder — Generally speaking if many are present they all shew practically the same physical characters & chemical composition.

The Size varies greatly, ranging from a mere speck to masses measuring 6 inches by $2\frac{3}{4}$ or even 3 inches by $8\frac{3}{4}$ as recorded by Von Schweppe.[1]

The Shape depends on the seat of development & on the number of stones present, they are often round or oval- polyhedral ones are often faceted with rounded corners & edges, & the surfaces plane, concave, or convex, cubes etc are also met with- Naunyn[2] regards the facets as the result not of friction but of pressure, the edges & corners may be split off by pressure.

The Color ranges from black thro brown & yellow to almost a pure white, most of the colouring is derived from the colouring matter of the Bile- pure cholesterine crystals may shew a translucency when fresh but lose it when dry.

The Surface may be smooth, soft & greasy, or uneven rough & granular, it may shew crystalline protuberances or depressions as if worm eaten.

The Consistency is generally but slight & they can usually be crushed between the fingers, when more resistant there is generally a considerable amount of Lime Salts present.

The Specific Gravity of course varies, being greater when they are fresh & moist than when they are dry- Hein[10] found the Specific gravity of a fresh stone to be 1027- others found stones as high as 1960 but these probably contained Lime salts- Fresh stones will sink in water, in dried ones the previously contained water is all replaced by air & they generally float. It seems probable that

it is very rare for gall stones to float in Bile
The structure of calculi has been made use of as a means of classification, Frerichs[10] recognises :-
(A) Simple homogeneous calculi having a uniform texture & a fracture which may be (1) Earthy as when the calculus consists of earthy matter, or a mixture of cholesterine & compounds of cholepyrrhin & lime (2) Saponaceous as when the calculus consists of Bile-resin or its calcareous compound or of soap & cholesterine. (3) Crystalline when the calculus consists of pure crystaline cholesterine.
(B) Compound calculi containing a nucleus which is surrounded by a shell & usually by a crust.
The nucleus is mostly either black or brown, it consists of cholepyrrhin & lime together with some mucus, sometimes also Cholate of Lime or crystaline Cholesterine, rarely foreign bodies as Hordeolum worms ~~form~~ form the nucleus - generally the nucleus is central but it may be excentric - The shell is usually striated & consists of crystals of Cholesterine arranged in a radiated manner, the crystals may be pure or mixed with pigment; generally there is also a concentric laminated appearance indicating that the growth of the concretion has resulted from the deposit of successive layers; very rarely the shell consists entirely of these concentric laminae, often the shell is devoid of all structure & presents neither striae nor laminae, but is earthy or soapy. The crust in a few cases is awanting, the radiating fibres of cholesterine thus reaching the surface & rendering it warty.

the crust however is generally present & may be recognised from the shell by its colour, lamination & consistence — a cholesterine crust is smooth, white or yellow & of satin like lustre, a cholepyrrin stone crust is very thin, brown or black a carbonate of lime crust may be either thick & brown or smooth; laminated & white or again may be a warty like encrustation

Naunyn[2] classifies the calculi arising in the gall bladder as follows

(1) Pure cholesterine (2) Stratified cholesterine &

(3) common Biliary calculi, usually numerous, multiple & faceted

(4) mixed, Bilirubin-calcium usually having cholesterine scattered through them. (5) pure Bilirubin-Calcium (6) rare forms including amorphous or imperfectly crystallised cholesterine calcium carbonate & conglomerate calculi

With regard to the different substances found in calculi it may be noted that the following are most common:-

(1) Cholesterine forms the entire mass of some calculi; most of them have it as their chief constituent amounting often to 70-80%

it is generally crystalline in form but may be amorphous

(2) Biliary colouring matters are present in varying quantities in nearly all stones, the most important is Cholepyrrin, which occurs either pure or combined with Lime, it is more plentiful in the crust & nucleus than in the middle zone

(3) Biliary acids & their salts, in most calculi Biliary acids are found in small quantities generally combined with Soda more rarely with Lime

Fatty acids are ~~present~~ sometimes present in combination with Lime as Margarate of Lime

Lime is the only important inorganic ingredient of gallstones as already mentioned it may be combined with Cholepyrrin or Biliary or fatty acids but it also occurs as Carbonate of Lime — this last salt generally forms only an incrustation, it originates chiefly from the mucus of the gallbladder & is most likely to be precipitated when the Gallbladder is free from Bile —

Pathological Results.

Gallstones may be present in the Intrahepatic ducts in immense numbers & are then generally small, soft & dark coloured — when thus present the Bileducts tend to become dilated & may assume either a Sacculated or cylindrical form with these changes there is almost always associated Catarrh & at a later stage probably ulceration of the Duct-wall. In such cases too a surrounding Fibrosis ie an Interstitial Cirrhosis is met with — Charcot[12] affirms that cirrhosis arises from chronic obstruction of the Bileducts. but Sharkey[13] & Osler[14] deny any such occurrance — In some cases the inflammation may be so acute as to produce Abscess of the Liver — Pylephlebitis may arise from extension of the inflammation to a branch of the Portal Vein — Rarely as a result of the formation of fibrous tissue a gallstone may become encysted

as regards the Hepatic duct itself it very rarely contains stones and hence it is uncommon to find in it any lesion resulting from Gallstones The Gallbladder may become changed in many directions, Sometimes indeed no change can be made out, but this is rare — concretions up to the size of a Millet-seed may be found embedded in the Bladder Wall these probably are formed in the dilated gland cavities, Sometimes a stone may be found adhering to the mucous membrane — Inflammation of the mucous membrane is of course common, there may be Muco-purulent Catarrh which may go on to Empyaemia of the Gallbladder or there may be more or less ulceration which may even end in perforation — This perforation may open into the Stomach or Intestine, into the substance of neighbouring solid organs or involve the abdominal Wall & so open on the surface or again the perforation may open into the general peritoneal cavity As a result of a chronic inflammation the walls of the Gall Bladder may contract into a firm small sac, with smooth lining membrane which is closely applied to the contained stones — This is usually preceded by Hydrops Vesicae — As a result of constant attempts to expell its abnormal contents there may arise a hypertrophy of the muscular fibres of the Bladder leading to thickening, the interior may present a fasciculated or sacculated appearance — While these changes are taking place there is probably a thickening of the Serous coat with or without adhesions to the Stomach, Colon Duodenum or Liver, these adhesions are by some said to give rise to symptoms resembling those produced by stones in the Gall Bladder

a final stage is reached when calcification of the walls occurs
of this there are two forms described viz:-
(1) Incrustation of the mucous membrane with lime salts
(2) True infiltration of the walls with lime the so called ossification (Osler) 14
The cystic duct is often completely blocked with stones impacted
in it, when this happens dropsy of the gallbladder develops, no Bile
can pass into or escape from the bladder - The Bile in the
gallbladder at the time of the obstruction is removed by the
lymphatics, mucus however continues to be poured out
& distends the sac which may ultimately become very large
Tait found one occupying the greater part of the abdomen
Around the impacted stone there is inflammation of the duct wall
which may lead to perforation or to a fibrous stricture
The common duct - is often the seat of an impacted gallstone
at the same time it is capable of considerable dilatation, the great
difficulty seems to be to get dilatation at the diverticulum of Vater
a stone not at first blocking the duct may close by growing
larger, or by the lumen of the duct becoming smaller from
inflammatory swelling - as a result of pressure ulceration
may occur & may go on to perforation - The duct sometimes
becomes dilated into quite a wide sac, Frerichs[10] describes one
8 inches long by 5 inches wide, even with such dilatation the
gallbladder is not necessarily enlarged, it is to be remembered
the duct contains not Bile but a colourless mucus, for as
soon as the contained fluid reaches a certain pressure the

Bile passes into the lymphatics — as a result of damage caused by passage of gallstones there may develop a fibrous structure of the duct.

With persistent obstruction there is a tendency for the production of Catarrhal or Suppurative Cholangitis, in the first of these conditions the Common duct often admits the finger; the Hepatic duct & its radicals in the Liver are greatly dilated the mucous membrane of the ducts is clear & smooth and filled with a clear colourless mucus. in obstruction with Suppurative Cholangitis the mucous membrane is thickened rough & even ulcerated. Sometimes there is extensive Suppuration in the ducts throughout the Liver and even empyaema of the Gallbladder, Suppuration may extend beyond the ducts of the liver producing Hepatic abscess, and acute Suppurative Peritonitis may follow, the microorganisms found in cases of this kind are Streptococcus Pyogenes, Staphylococcus pyogenes aureus Bacillus Coli communis & Diplococcus Pneumoniae

Carcinoma is not infrequently found associated with gallstones, it may involve either the Gallbladder or one of the ducts, it seems probable that its development is due to continued irritation of the mucous membrane by the calculi, but the opposite view is held by some viz. that the carcinoma is primary & obstructs the escape of Bile & so favours the formation of calculi

Fistulae opening in various directions are not an uncommon result - Murchison[6] quotes four cases which opened into the Stomach, such an opening would explain the presence of Calculi in the vomit, it is said that vomited calculi as a rule find their way into the Stomach by reversed peristaltic - Fistulae opening into the Duodenum are more common, Murchison[6] quotes 34 cases, Stones reaching the Intestine in this way may pass onwards & be expelled "per anum" or may if of large size cause Intestinal Obstruction - The fistulous opening is generally at the Fundus of the Bladder, more rarely from the Common duct - an opening into the Colon seems to be rarer than into the Duodenum tho more frequent than into the Stomach, as great variaties we may find communications with an open Urachus, the Pelvis of the Right kidney, the Lungs, the Portal Vein, or the Hepatic duct - In some cases gallstones have been found in the Abdominal cavity having escaped either from the the gallbladder or the Common duct. Abscess cavities containing gallstones have frequently been found in the neighbourhood of the Gallbladder or ducts Acalculus in the lowest part of the Common duct seems sometimes to set up an inflammation of the duct which extends to the head of the Pancreas, an interstitial inflammation of the gland follows which ends in the formation of hard masses clinically such a condition resembles a case of Cancer of Pancreas[9]

Xanthelasma or Xanthoma not infrequently occurs in long standing cases of Jaundice — generally after a duration of 18 months this that form known as Xanthoma Multiplex (Morris)[4] in which the lesions are mostly nodular but flakes may occur it affects chiefly the Eyelids but occurs also in the mouth Pharynx, Hands or Penis — The disease consists of yellowish deposits in the Corium either in flakes or plates or nodules — The deposit has been compared to atheroma in the coats of the arteries — Clinically the most common forms are the soft yellow not raised plates seen in the Eyelids

Symptoms of Gallstones

The Symptoms of Gallstones vary especially in relation to their site if in the gallbladder the Calculi may be absolutely quiescent or "Calculi" or may cause such slight inconvenience that the patient disregards it, or may complain only of discomfort in the Hepatic region — According to Mayo Robson[15] where Gallstones are found post mortem in people who have never complained of pain it will be found in the majority of cases that there are no adhesions of the Gallbladder While the migration of Calculi may take place without pain yet generally when a Calculus passes into the Cystic duct there is a sudden onset of lancinating pain commonly known as "Hepatic Colic", this may radiate towards the Back, the angle of the right Scapula

the left. Inflammatory lesion or downwards into the Abdomen rarely however does it extend below the umbilicus
When severe the pain is accompanied by vomiting, flatulent eructations, pallor & more or less collapse -
The duration of the pain varies from a few minutes to several hours or rarely to a couple of days & leaves behind it a feeling of great tenderness to pressure, it may pass off quite suddenly on the escape upward or downwards of the stone from its narrow passage, or it may pass off gradually, probably coincidently with the exhaustion of the muscular wall of the duct - the paroxysms of pain are especially liable to occur after meals or violent exertion -
Sickness is a common symptom in the subjects of Lithiasis, some attacks as already noted occur during the Colic, others seem to be due to the passage & possibly the movement of Calculi in the gall bladder
Vomiting occurs especially towards the end of the attack of Colic, the vomit at first consists merely of the Stomach Contents, but later provided the common duct is not blocked it is composed of a Bile stained fluid & may even become Stercoraceous - rarely a calculus has been found in the vomit its presence being explained either by reversed peristalsis or by the presence of a fistulous opening between the gall bladder & Stomach

Collapse may arise either from very severe or prolonged pain or from persistent vomiting, it may vary between mere prostration with cold clammy sweat, feeble pulse & subnormal temperature, to a collapse which may prove fatal - Between these extremes we may meet with collapse simulating that produced by perforation of an abdominal organ - convulsions may also occur.

Jaundice arises when a calculus completely or almost completely obstructs the Common duct; under such conditions an accumulation of Bile takes place behind the obstruction, when the Bile pressure reaches a certain height the Bile passes into the lymphatics & thence thro the Thoracic duct into the general circulation producing Jaundice, the Urine becomes Bile stained and the conjunctivae and skin tinted - The faeces are often fetid & usually clay coloured, by some this latter is regarded as due to the absence of Bile pigment - but others attribute it to the presence of undigested fat.

There is often constipation, but this may alternate with attacks of irritative diarrhoea - The obstruction of Jaundice seems worthy of attention

Osler[14] regards the following constitution as characteristic of Gallstones. ÷

"Jaundice of varying intensity, deepening after each paroxysm, which may persist for months or even years

(2) Ague like attacks characterised by chill, sweating & fever after which the Jaundice usually becomes more intense
(3) at the time of the paroxysm pain in region of the Liver

Fever is often present in cases of gallstone colic especially if the Jaundice is also present, soon after the colic there is rise in temperature & the temperature rises to say 103°F. the attack is short but tends to recur — Murchison[6] and Ord regard the fever as purely reflex from irritation of the mucous membrane but more probably the attacks are due as Charcot says to the absorption of septic organisms and their products through a lesion of the mucous membrane produced by the gallstones this view is supported by the fact that Micro organisms have been found in the Blood & that Septic Endocarditis & enlarged Spleen may be found later —

In cholelithiasis there may be (according to Riedel[16]) Jaundice when there are no calculi in the ducts — he states that the lumen of the Cystic duct & the Common Bile duct may be blocked by an inflammatory Swelling beginning in the Gall bladder & Spreading thence & as a result there may be colic. Jaundice & an enlarged Gallbladder Jaundice may therefore be due to (1) complete occlusion of the duct by a large stone. (2) Inflammatory Swelling set up by a small calculus lying in the duct. (3) Distension of Gallbladder by the duct caused by calculus in the Gallbladder

The Pulse rate is often interesting – in jaundice without fever the rate is frequently normal or subnormal. even with arise of temprature the pulse rate may be normal with rigors however it is generally increased in rate during the severity of the Colic the pulse may be imperceptible the retardation of the pulse in jaundice has been referred to the action of the Bile acids –

Bile stained urine is often the earliest indication of the onset of Jaundice – the presence of Bile pigment is to be recognised by the play of colors from Green thro Blue to yellow on addition of impure nitric acid –

Itching of the Skin is in gallstones as in catarrhal Jaundice not in frequently very troublesome, it has been refered to the action of the Bile acids on the nerve endings

As a result of gallstone Obstruction + subsequent pathological processes we may have symptoms of Catarrhal Cholangitis or of Suppurative cholangitis (Osler)[14]

In Catarrhal cholangitis there are ague like paroxysm with chills, fever + sweating. the Jaundice is of varying intensity. deepning after each paroxysm + persisting for months or even years, with the paroxysm there is pain in the region of the Liver, with gastric disturbance rigors are intense, the temperature rises to 103 to 105 + the chills may be of daily occurance or of the Tertian

or Quartan-type, between the attacks the temperature is normal, the general health is not progressively deteriorated, the Liver is not as a rule enlarged -

In Suppurative Cholangitis the fever may be intermittent but is more often remittent, the Jaundice is not so intense and does not deepen after the paroxysms - there is generally more enlargement of the Liver, with tenderness & more definite signs of Septicaemia, the cases run a shorter course and recovery very rarely if ever occurs

Tumor in the region of the Gallbladder

In cholelithiasis the Gallbladder may form a Tumor under the following conditions :-

(1) The Cystic duct being blocked by a calculus the Gall bladder becomes distended by mucus

(2) a calculus acting as a ball valve allows Bile to enter the Gall bladder but prevents its escape

(3) a Gallbladder containing calculi or fluid presses on and obstructs the Cystic duct

(4) Calculous cholecystitis extending into & blocking the cystic & common Bile ducts.

According to Taylor the Gallbladder enlarges downwards & forwards in a line drawn from the tenth Right costal cartilage and crossing the Middle line a little below the umbilicus -

The size varies from a Tumor just perceptible to touch

to one which may resemble an ovarian cyst-
While it is generally closely applied to the anterior
abdominal wall it may project backwards into
the Loin & simulate a Renal tumor — If doubt-
arises as to which of these the swelling is Ziemssen[18]
advocates the distension of the Colon with air or
Carbonic acid gas — if then the swelling is kidney
it will be pushed further into the Loin, while if it
is gallbladder it will be pushed upwards & forwards
According to Marp Rolson[15] this test does not always
furnish useful information, a distended gallbladder
however can generally be recognised by.
(1) Its position in the right side of the abdomen
(2) It moves with the Liver in respiration
(3) It grows from above downwards
(4) The small rounded outline
(5) Possibly feels cystic or if large may get fluctuation
(6) Dulness on percussion, with or without resonance
between it & the Liver according as to whether the Colon
does or does not cross it.
(7) It starts from the Liver notch
(8) Its lateral mobility —

The distension of the Gall bladder may vary from the
stone changing its position & allowing intermittent

patency of the cystic duct — pressure may also as Harley[3] points out diminish the size of the Tumor A perceptible distension of the Gall Bladder without Jaundice indicates either (1) Stricture of the Cystic duct or (2) impaction of a stone in it — Distension of the Gall Bladder with Jaundice is according to Mayo Robson[15] almost always due to cancer of the head of the Pancreas, or of the Common duct In most cases of obstruction of the Common duct the Spiral valve in the Cystic duct tends to prevent Bile under high pressure passing into the Gall-bladder Gallstones in the motions should be sought for by stirring up the motion in water to which Carbolic acid may be added & then passing thro a sieve — While their presence in the motions is valuable evidence it is to be remembered their absence even over a prolonged period is of no positive value, as on the one hand a calculus may slip back from the cystic duct into the Gall-bladder and on the other hand a calculus escaped into the Intestine may be disintegrated before reaching the anus — Sounding the Gall-bladder by a cannula & trocar or by an aspirating needle is dangerous from the tendency to subsequent Leakage & should not be performed It is safer to make a small exploratory incision with due antiseptic precautions & if further operative treatment is required to enlarge the opening ——

Treatment may be required for the Colic; for the lodgement of a stone in the passages, or for some complication -
It must at once be admitted that no drug is known which can dissolve a Gall stone in situ -
As regards Colic, by far our most useful remedy is Opium in some form or other - it is best to give it in the form of a hypodermic injection of Morphia & it is to be remembered that here a large dose is both requisite and safe. The pain may however be so intense that relief is only to be obtained by putting the patient under the influence of chloroform - Hot baths are useful as are also large draughts of hot alkaline solutions as Sodae Bicarbonat. - Stimulants are frequently useful
The use of Morphia has been objected to as tending to diminish the Secretion of Bile - This objection may (Waring) be got over by combining with the Morphia gr 1/120 of Sulphate of atropine or according to Burney Yeo by giving large quantities of warm water with Bicarbonate and Salicylate of Soda - Olive oil has for many years been from time to time vaunted as efficacious in gallstone colic & jaundice, it seems without doubt to have given relief to patients who were troubled by frequently recurring Colic & Jaundice & to have at last given them long periods of freedom from pain. It must be admitted that its mode of action is unknown & that it does not

increase the number of gallstones found in the faeces
Some have reported the passage during its administration
of large numbers of "Softened Gall stones", but it is
evident that these were merely concretions formed of
fatty acids with Bile pigment; such bodies are to be
found if Olive oil be administered in cases of Catarrhal
Jaundice, or in cases where the Bile duct is obstructed
by pressure, Mayo Robson says that he has never found
Olive oil of the slightest service in causing expulsion
or favouring the passage of Gall stones, my experience
confirms this but I have known cases considerably
benefitted by a course of Linseed oil, the interval
between the attacks was markedly increased & al-
the same time the active function of the Bowel
was considerably increased, the tendency to obstinate
constipation in this disease is one of the most
troublesome conditions we have to treat.
Belladonna has also been given during attacks of colic
it has been supposed to act by relaxing the muscular
~~fibres~~ fibres & so allowing the passage onwards — If
used it should be given freely, until the patient is
deeply under its influence, inunction with a paste
composed of Glycerine & Extract of Belladonna is
extremely soothing & its effects may be heightened
by the application of warm cloths over the part

For those who are the subjects of Cholelithiasis; but who are not suffering from colic or from the lodgement of a calculus in the ducts a good deal may be done As was noted in speaking regarding Etiology the tight clothing is by many regarded as favouring the formation of Gallstones, there should therefor be nothing ~~the~~ worn about the waist which is tight.
Plenty of open air exercise should be taken, but nothing of a violent nature should be attempted Even cycling if moderation is practised is extremely valuable horse back exercise is also useful. Duckworth[20] advises that patients subject to colic should not take exercise about the time the food leaves the stomach, for at that time the Gall Bladder is emptying itself and exercise might easily dislodge a calculus.
Brocktank[5] advocates in the intervals between the attacks & when all acute symptoms and distension of the Gallbladder have subsided, gentle massage several times a day over the right Hypochondriac Region - He says this is of use in aiding the expulsion of Bile from the Gallbladder & ducts.— While this procedure may possibly be of use, the form of massage advocated by Geo Harley[22] should be avoided He there advocates massage & compression of the distended Gall Bladder so as to expel calculi

Such a forcible proceeding is dangerous in as much as it may easily produce ulceration or even rupture of the Gallbladder & ducts - Puncture of the gallbladder described by the same author is to be avoided - when this operation is performed the still distended gall bladder is almost sure to leak & to set up Peritonitis - It is to be remembered that in these cases the sac contains not Bile, the escape of which might be innocuous, but a mucus or mucopus containing various micro-organisms Opinions differ as regards the dietetic treatment of Cholelithiasis of course foods which derange the Liver must be avoided; if it be true as Brocklank thinks that the Bile salts which help to dissolve the cholesterine are derived from Nitrogenous foods, and are deminished in amount when such foods are not taken, then it is evident that the more easily digestible forms of nitrogenous food should enter largely into the dietary of those Subject to Cholelithiasis -

Lauder Brunton[21] lays stress on the importance of drinking plenty of water & says that almost every patient with Gallstones that he saw confessed to drinking too little water, he makes such people drink a large tumbler of water, preparably hot; with or without carlsbad Salts every morning, & finds that the renewed formation of Gallstones may in many cases be prevented -

This line of treatment has given me most satisfactory results. but I find it is advantageous to order together with the "Carlstad water" an equal quantity of "Aesculap water". I generally direct the patient if a male to take every morning, about an hour before Breakfast. 4 ozs of Carlstad water & the same quantity of Aesculap water made up to a pint with hot-water this should be sipped slowly & it is important that no other fluid or food should be taken for at least half an hour. It is found that when the mixture is taken as hot as it can be ~~conveniently~~ conveniently sipped, it is almost entirely devoid of taste - for a female the quantity ordered is reduced by 1/3rd. This is persisted in for a fortnight & then each of the mineral waters are diminished by an ounce, after continuing this for a further period of 14 days, the treatment is altered & 2 oz of Carlstad water in a pint of hot-water is ordered for another month - then the patient discontinues further treatment for a period of 3 months after the ground of treatment is ~~recommenced~~ re-commenced - By some such plan it will be found that whilst the patients appetite is improved, loose flaby fat which is of so often present is got rid of & the patient experiences a feeling of increased vigour & mental & bodily activity -

alkalies given thus or in similar ways do not seem to have any solvent action on gallstones & the benefit derived is partly due to the previously mentioned good effects of water & partly to their power of stimulating the Intestines & so obtaining a regular evacuation of the Bowels & partly to their power of stimulating & improving the digestive processes. In this connection we must not omit to mention the great benefit obtained by a course of treatment at some of the Home & Continental Spas of the latter Carlsbad is probably the most efficacious, Contrexeville, Vichy. Homburg & Kissingen are also used in great repute, whilst in England, Harrogate & Bath are found useful. Harrogate is fortunate in possessing no less than six different springs. The composition of the waters differing in each case. The strong & mild Sulphur springs waters are generally taken before breakfast & in the afternoon a pleasant aerated Chalybeate water is taken.

Salicylate of Soda in doses of xv grains thrice daily is often useful. probably it acts thro' its cholagogue effects.

It is of the utmost importance that the Physician should have clearly in his mind the conditions which necessitate the calling in of the Surgeon. under the following conditions in cholelithiasis an operation is necessary:-

(1) Distended gallbladder forming an abdominal Tumor
(2) Persistent Jaundice from a stone in the Common duct
(3) Recurrent Biliary Colic, injuring health not relieved by Medical treatment
(4) Signs of inflammation about the gall bladder with attacks of Biliary Colic
(5) Acute peritonitis due to perforation of the gall bladder or Biliary ducts

As regards the treatment of Intestinal obstruction due to gallstones there is considerable difference of opinion, one School advocates early operation by Laparotomy, the other opium, Belladonna, Starvation, injections & even massage under an anaesthetic — Mayo Robson[15] says that if one could be certain that the block was due to a gallstone probably the expectant treatment would be advisable since records show that the stone will eventually pass, the difficulties of diagnosis are he says however so great that probably the safer plan is to operate early.

Surgical Treatment - on following pages.

The Surgical treatment of gallstones & their complications will be very shortly referred to. In considering the propriety of operation one must remember that the blood is vitiated with bile & there is in many cases a considerable tendency to haemorrhage. When such a haemorrhagic diathesis is suspected Mayo Robson administers Calcium chloride in large doses, with a view of increasing the coagulability of the blood, he gives XV grains every 4 hours for two days previous to the operation It is to be remembered that protracted jaundice does not always induce this tendency to haemorrhage after operation. The chief operations performed are :-

Cholecystotomy consists in incising the gallbladder, removing the calculi & stitching the edges of the wound to those of the abdominal incision - In doing this Robson stitches the edges of the gallbladder incision to the aponeurosis not to the skin of the abdominal wall - a fistula should not occur if all the calculi have been removed from the duct-

Cholecystostomy consists in incising the gallbladder, suturing the edges of the wound to the abdominal wall & closing the incision by extra-peritoneal sutures, after the contents of the gallbladder have been removed - This operation is seldom performed

"Ideal" Cholecystotomy consists in incising the gallbladder emptying it of its contents, closing it up again, & replacing it in the abdominal cavity at the same operation - it is said to be an easy & quick operation, to give a rapid convalescence

and to lessen the chance of fistulae & weakness of the abdominal wall. The objections to it are that it is very difficult during an operation to be sure that all the calculi have been removed from both the gall bladder & ducts - if not completely removed relapses are liable to follow it.

Cholecystenterostomy is the artificial formation of a gallbladder - intestinal fistula, the walls of the gallbladder & intestine being united by sutures or "buttons" - it has been advocated especially in cases where the common duct is blocked by stones which cannot be removed - incision of the ducts seems to have largely displaced this operation.

Cholecystectomy or extirpation of the gallbladder consists in ligaturing the cystic duct, dissecting the gallbladder from its attachments & cutting it off - it is indicated in persistent biliary cutaneous fistulae with blocked cystic duct - in empyema of gallbladder with blocked cystic duct - and in some other conditions - It is contra-indicated when the gallbladder is strongly adherent to the liver when the common duct is blocked by permanent changes as stricture

Cholelithotrity consists in crushing calculi lying in the ducts either by the fingers or by padded forceps - The fragments are left to find their way out either through the intestine or more frequently thro' the cutaneous fistula

Choledocholotomy consists in the incision of one of the ducts the removal of the stone & suture of

the incision in the duct - If no calculi are present in the gallbladder some advise that it be not opened while others would incise it, so as to get drainage as in an ordinary case of Cholecystotomy - In cases where the duct cannot be sutured after incision a good result can often be obtained by placing the end of a drainage tube near the incision & bringing it out through the abdominal incision

As regards Prognosis Space permits only to say that calculi seem rarely to reform after operation - Partially this is due to the mucous membrane recovering its healthy condition.

Finis

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