

CHOLEGRAPHY

Easy Visual Reviewer — Terms & Definitions Matrix

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■ MODULE OBJECTIVES

1. Describe oral cholecystography procedure.
2. Describe the applied anatomy of the study.
3. List the major indications and contraindications of the procedure.
4. List the contrast media to be used.
5. Describe patient preparation for the procedure.
6. Describe post procedure care or follow up care.

■ GENERAL TERMS

CHOLEGRAPHY	the older general medical imaging term for a radiographic study of the biliary system.
CHOLECYSTOGRAPHY	the radiographic investigation of the gallbladder
CHOLANGIOGRAPHY	the radiographic study of the biliary ducts
CHOLECYSTOCHOLANGIOGRAPHY	radiography of both the gallbladder and the biliary ducts
ORAL CHOLECYSTOGRAPHY (OCG)	A study of the bile sac with a radiographic contrast medium taken orally the day before the examination.

Note: OCG is useful when patient has symptoms of cholelithiasis but a negative ultrasound. Useful for counting the number of stones present.

■ ROUTES OF ADMINISTRATION OF CONTRAST MEDIA

BY MOUTH (Oral)	after eating, the CM is absorbed by the intestines carried to the liver by the way of the portal veins and then it will enter the gallbladder rendering it radiopaque.
BY INJECTION INTO A VEIN (Intravenous)	injected either by a: 1. Single bolus 2. Drip-infusion — after the injection of the CM it will be included in the blood circulation and enters the liver through the hepatic artery and then it will enter into the gallbladder rendering it radiopaque.
Percutaneous Transhepatic Cholangiography (PTC)	contrast is injected directly into the intrahepatic bile ducts using a percutaneous needle puncture under fluoroscopic guidance.
Operative or Immediate Cholangiography	contrast is injected directly into the common bile duct or cystic duct during surgery (e.g., cholecystectomy) to visualize ductal anatomy and check for stones or leaks.
Post-operative, Delayed or T-tube Cholangiography	direct instillation of contrast into a biliary duct through an indwelling drainage tube after surgery

■ CONTRAST MEDIA

For Oral Cholecystogram	the contrast medium used is organically bound iodinated salts either Iopodate sodium (sodium iopodate) or Iopodate calcium. Both salts require 1 to 3 hours for maximum opacification of the biliary ducts. To achieve maximum concentration and opacification of the gb, the contrast media should be ingested 10-12 hours before the scheduled imaging for concentration in the gb and the gb should not be stimulated to contract and release the contrast-laden contents.
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Oral CM Examples	Biloptin (Sodium iopodate) capsules, Oragrafin (Iodate sodium) capsules, Telepaque (Sodium iopodate, Iopanoic acid), Bilopaque (Meglumine Iothalamate), Teridax (Iocetamic acid), Solu-biloptin (Calcium iopodate)
For Intravenous Cholecystography	Cholografin Meglumine (Iodipamide Meglumine), Biligrafin (Iodipamide Sodium/Meglumine), Duografin (Iodipamide + Sodium/Meglumine salt mixture), Cholebrine (Iodipamide)
For Direct Injection Method	water-soluble, iodinated contrast: Telebrix (Ioxitalamate); Ionic, high osmolar contrast: Conray (Iothalamate), Hypaque (Diatrizoate); Non-ionic, low osmolar Contrast: Ultravist (Iopromide), Iopamiro (Iopamidol), Optiray (Ioversol)

■ COMMON CLINICAL INDICATIONS

CHOLELITHIASIS	presence of stone in the gallbladder
CHOLEDOCHOLITHIASIS	stones in biliary ducts
PURE CHOLESTEROL STONE	appears as negative filling defects within the pacified bile
CALCIUM CONTAINING STONE	can be readily detected on a plain film because it is radiopaque which appears white on the radiograph
CHOLECYSTITIS	inflammation of the gallbladder
BILIARY STENOSIS	narrowing of biliary duct
NEOPLASM	Malignant or cancerous tumors of the gallbladder can be aggressive and spread to the liver, pancreas, or gastrointestinal tract. Neoplasms of the gallbladder are rare.
CONGENITAL ANOMALIES	Gallbladder agenesis and cystic duct absence
Additional Indications	to determine the patency and condition of the biliary ducts; to determine the function of the liver-its ability to remove the contrast medium from the bloodstream and excrete it with the bile; to determine the concentrating and emptying power of the gallbladder.

■ CONTRAINDICATIONS

Contraindications	contraindicated for patients with vomiting or diarrhea, pyloric obstruction, malabsorption syndrome, severe jaundice, liver dysfunction, hepatocellular disease, elevated bilirubin, previous cholecystectomy or hypersensitivity to iodinated contrast media.
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■ PATIENT PREPARATIONS (Oral Cholecystography)

1. Laxative	A laxative 2 days prior to the examination.
2. Cleansing enema	Cleansing enema at 3:00 p.m.
3. Light supper	Give a light supper consisting of non-fatty meal.
4. Contrast tablets	Give at least 6 to 12 tablets of contrast media (Telepaque or as prescribed by the radiology department and attending physician).
5. Tablet schedule	Take 1 tablet every 5 minutes followed by a small amount of water until the tablets are all taken approximately 2 to 3 hours after the evening meal on the night before the examination.
6. Elixir Paregoric	Give 8 cc of Elixir Paregoric 30 minutes after the intake of Telepaque to relieve abdominal pain.
7. NPO	NPO at midnight.
8. Morning enema	Cleansing enema at 5:00 a.m.
9. Morning	No breakfast and report for examination at early in the morning.

Laxative note	If used, laxatives are administered 24 hours before the ingestion or injection of a contrast agent to allow irritation of the intestinal mucosa to subside and, in the oral technique, to prevent egestion of the contrast medium with the fecal material.
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■ STAGES OF THE EXAMINATION

First stage	Prior to the examination a control image is taken. 20° left anterior oblique (LAO). An information sheet and contrast agent are given to the patient to take home.
Control radiograph purpose	This radiograph serves a dual purpose: a. assessment of bowel fecal content to determine the extent of cleansing enemas required. b. identification of small radiopaque stones that might otherwise be camouflaged by the contrast medium.
Second stage	contrast images
Third stage: AFM	the images for this stage should show that the gallbladder is emptying satisfactorily and is not obstructed by calculi. After satisfactory contrast images have shown the gallbladder, the patient is given a fatty meal (e.g. chocolate bar or a fat emulsion drink).

■ PROJECTIONS

1. Scout Film – PA Projection of gallbladder	taken to locate the gb and check patient preparation and concentration of the contrast medium in the gb. shows the semi-axial view of the opacified gb. Patient Position: Place the patient in the prone position with the MSP parallel to the long axis of the table. Part Position: Adjust the patient's body so that the right side of the abdomen is centered to the midline of the grid. Rest the patient's left cheek on the pillow to rotate the vertebrae slightly toward the left side. Film Size: 10 x 12 (lw), centered to the RUQ or 3 inches to the right of the spine and 4 inches superior to the iliac crest. Reference point: RUQ or 3 inches to the right of the spine and 4 inches superior to the iliac crest. CR: perpendicular to the center of the film. Respiration: Suspended at the end of exhalation.
2. Upright PA Projection of the gallbladder	the erect position will demonstrate layering of any gallstones. allows heavier stones to settle out in the fundus for better radiographic demonstration. Patient position: PA erect. Part position: right side of the abdomen is centered to the midline of the grid. Reference point: 2 to 4 inches below the gallbladder, as located from the scout image. CR: perpendicular to the center of the film. Respiration: Suspended at the end of exhalation.
3. LAO Position	show the opacified gallbladder free from self superimposition or foreshortening and from the structures adjacent to the gallbladder. provides another perspective of the gb. places the typical gb closest and most parallel to the image receptor, thereby minimizing shape distortion. Patient Position: Place the patient in the recumbent position for oblique projections of the gallbladder. Part Position: From the prone position, the patient's right side is rotated up 20 degrees; center the right side of the patient to the IR with the MSP parallel to the long axis of the table. Film Size: 8 x 10 or 10 x 12 (lw) 4 inches superior to the iliac crest. Reference point: midway between the vertebrae and the lateral border of the abdomen and 4 inches superior to the iliac crest. CR: perpendicular to the center of the film. Respiration: Suspended at the end of exhalation.
4. Supine 20° RPO	contrast medium fills the neck and Hartmann's pouch. Patient Position: The patient lies supine on the X-ray table. Part Position: the left side is raised rotating the MSP through 20°; the CP is now at an angle of 20° to the table. Film Size: 8 x 10 or 10 x 12 (lw) 4 inches superior to the iliac crest. Reference point: midway between the vertebrae and the lateral border of the abdomen and 4 inches superior to the iliac crest. CR: perpendicular to the center of the film. Respiration: Suspended at the end of exhalation.
Hartmann's pouch	spheroid or conical pouch at the junction of the neck of the gallbladder and the cystic duct

5. Right Lateral Position	used to differentiate gallstones from renal stones or calcified mesenteric lymph nodes if needed. The lateral position is also required to separate the superimposition of the gallbladder and the vertebrae in exceptionally thin patients and to place the long axis of a transversely placed gallbladder parallel with the plane of the IR. Patient Position: Place the patient in the recumbent position for lateral projections of the gallbladder. Part Position: The patient lies on the right side. Film Size: 8 x 10 or 10 x 12 (lw) 4 inches superior to the iliac crest. Reference point: 4 inches superior to the iliac crest. CR: perpendicular to the center of the film. Respiration: Suspended at the end of exhalation.
6. Right Lateral Decubitus	for the visualization of small gallstones. used to demonstrate stones that are heavier than bile and that are too small to be visible other than when accumulated in the dependent portion of the gallbladder. also used to demonstrate stones that are lighter than bile and that are visualized only by stratification. Patient Position: Place the patient in the right lateral recumbent position on a stretcher on the decubitus board or movable table in front of a vertical grid device. Part Position: Place the patient on the right side with the body elevated 2 to 3 inches on a suitable radiolucent support to center the gb region to the vertically placed IR. Film size: 14 x 17 (lw) for the inclusion of the entire abdomen, 8 x 10 or 10 x 12 for localized film. Reference point: RUQ or 3 inches to the right of the spine and 4 inches superior to the iliac crest. CR: Directed horizontally to enter the localized area of the gb. Respiration: Suspended at the end of exhalation.
7. Fatty Meal (motor)	given after satisfactory visualization of the gallbladder. consisted of a commercially available bar, eggs and milk, or eggnog. The meal will cause the gb to contract. an injection of the hormone cholecystokinin will also cause the gb to contract. seldom used today because of the diagnostic capability of ultrasonography. may be contraindicated if gallstones are present.
8. Post Fatty Film or Delayed Film	after eating the fatty foods another similar series of images taken 15 to 30 minutes later to check the emptying power of the gallbladder. essential for the cholecystographic diagnosis of adenomyomatosis and cholesterosis. occasionally helpful in diagnosing small stones.

■ POSTPROCEDURE INSTRUCTIONS & COMPLICATIONS

Postprocedure Instructions	Once the gallbladder has been adequately visualized, the patient can go home or return to the hospital room. Currently available contrast material is eliminated mainly through the alimentary canal. The patient should be instructed to eat and drink normally.
Complications – Side-effects	Side-effects are rare with sodium iopodate. Mild gastrointestinal disturbances- nausea, with or without vomiting and diarrhea – may occur. The incidence of diarrhea is greatest with iopanoic acid.
Skin reactions	urticaria, vasodilatation and pruritus- have been recorded.
Uricosuric action	Cholecystographic agents have a uricosuric action and alteration of serum urate may precipitate an attack of gout.

■ SURGICAL PROCEDURES

CHOLECYSTECTOMY	removal of gallbladder.
CHOLECYSTODUODENOSTOMY	surgical procedure uniting the gallbladder and the duodenum.
CHOLECYSTOGASTROSTOMY	surgical procedure in which the gallbladder is joined to the stomach.
CHOLEDOCHOLITHOTOMY	surgical incision of the common bile duct for the removal of stones.

■ KEY ANATOMY TERMS (from figures)

Gallbladder parts	Fundus, Body, Neck, Spiral valve, Cystic duct
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Biliary ducts	Right hepatic duct, Left hepatic duct, Common hepatic duct, Common bile duct, Pancreatic duct (duct of Wirsung)
Ampulla region	Hepatopancreatic ampulla (ampulla of Vater), Hepatopancreatic sphincter (sphincter of Oddi), Region of duodenal papilla (papilla of Vater)
Hartmann's pouch	spheroid or conical pouch at the junction of the neck of the gallbladder and the cystic duct

All definitions taken exactly from the source module. Grouped for easy review. Visual learner friendly layout.
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