
به نام خدا

COMPLICATIONS OFCOMPLICATIONS OF LAPAROSCOPICLAPAROSCOPIC CHOLECYSTECTOMYCHOLECYSTECTOMY

- GAS RELATED COMPLUCATIONS
- BILE DUCT INJURY
- BLOOD VESSLE INJURY
- GALLBLADDER PERFORATION & LOSS OF STONES
- BOWEL INJURY
- PORT SITE INFECTION
- PORT SITE HERNIA

Gallbladder Perforation and Loss of Stones

- Due to the way the gallbladder is held and manoeuvred during L.C. and due to its wall structure and probable grade of infection, the risk of rupture of the gallbladder during L.C. is quantitatively high

- This may lead to an increase of postoperative complications such as wound infections or intraabdominal abscess formations .

Retained stones

- Cause : Remnant of cystic duct or gall bladder

- Theory : " Cystic duct stump syndrome"
  - Increase in Choledochal pressure
  - Increase in cystic duct stump pressure
  - Increase in sphincter of oddi pressures

- Should a perforation occur, The bile liquid has to be promptly retrieved with adequate aspiration devices

- It is imperative that spilled stones be completely identified and extracted from the abdominal cavity.

Biliary Leak

- Leaks from the cystic duct stumpLeaks from the cystic duct stump
- unrecognized duct of Luschkaunrecognized duct of Luschka..
- Bile leaks commonly present shortly after cholecystectomyBile leaks commonly present shortly after cholecystectomy ((within 1 weekwithin 1 week)) with right upper quadrant pain, fever, chills, and hyperbilirubinemiawith right upper quadrant pain, fever, chills, and hyperbilirubinemia..
- CT scan and ultrasound will confirm presence of a complex fluid collectionCT scan and ultrasound will confirm presence of a complex fluid collection in the right upper quadrantin the right upper quadrant.
- Immediate operative intervention with wide drainage is only indicated if theImmediate operative intervention with wide drainage is only indicated if the patient is in septic shockpatient is in septic shock.. Attempts at early repair are dangerous because ofAttempts at early repair are dangerous because of the inflammatory response incited by the bile leakthe inflammatory response incited by the bile leak.
- Percutaneous drainage of intraPercutaneous drainage of intra--abdominal fluid collections followed by anabdominal fluid collections followed by an endoscopic biliary stenting resolves most leaks without need for operativeendoscopic biliary stenting resolves most leaks without need for operative interventionintervention..
- If bile leaks fail to resolve after 6 weeks, further imaging with MRC andIf bile leaks fail to resolve after 6 weeks, further imaging with MRC and endoscopic imaging may be necessary to rule out a common bile ductendoscopic imaging may be necessary to rule out a common bile duct injuryinjury.. When the acute inflammation has resolved 6 to 8 weeks later,When the acute inflammation has resolved 6 to 8 weeks later, operative repair is performedoperative repair is performed.

Retained Biliary Stones

- Retained stones following cholecystectomy present soon afterRetained stones following cholecystectomy present soon after ((<4<4 weeksweeks)) surgery and are best treated endoscopicallysurgery and are best treated endoscopically.
- If stones are found shortly after the cholecystectomy, they areIf stones are found shortly after the cholecystectomy, they are classified asclassified as retainedretained;; those diagnosed months or years later arethose diagnosed months or years later are termedtermed recurrentrecurrent .
- Patients will present most commonly shortly after cholecystectomyPatients will present most commonly shortly after cholecystectomy with sharp, intense right upper quadrant pain and jaundicewith sharp, intense right upper quadrant pain and jaundice.. BilirubinBilirubin and alkaline phosphatase elevation should prompt endoscopicand alkaline phosphatase elevation should prompt endoscopic clearance of biliary stonesclearance of biliary stones.. Recurrent stones may be multiple andRecurrent stones may be multiple and largelarge.
- A generous endoscopic sphincterotomy will allow stone retrieval asA generous endoscopic sphincterotomy will allow stone retrieval as well as spontaneous passage of retained and recurrent stoneswell as spontaneous passage of retained and recurrent stones.

Blood Vessel Injuries

- Cystic arteryCystic artery
- Right hepatic arteryRight hepatic artery
- Portal veinPortal vein
- Inferior epigastric vesselsInferior epigastric vessels

- In order to clearly identify the cystic artery, without injuring larger branches, we need to identify the vessel where it enters the wall of the gallbladder and divides itself.

- so in preparing the cystic artery we need to stay close to the gallbladder.

- In the event of bleeding a "blind" clipping or the "blind" use of diathermy is not the method of choice though it sometimes appears to be the fastest way to stop bleeding.
- Such methods should only be performed when confident that we are dealing with a second branch of the cystic artery and not with a more proximal vessel.
- Precarious clip placement or the extensive use of diathermy on such a larger supply vessel may result in a reduction of the liver blood supply especially when dealing with a common hepatic artery.

- Though it seems that isolated injuries of the right hepatic artery usually remain clinically insignificant in otherwise healthy patients,
- Additional risk factors such as hypoxemia, cholangitis, sepsis, liver cirrhosis or abnormally reduced portal venous blood flow,
  All create a high risk for the development of ischemic liver necrosis,

abscess formations in the liver and further complications such as destructive cholangitis and secondary biliary cirrhosis.

- Trocar channel bleedings may stop during trocar placement which places a certain pressure on the bleeding vessel, but may reoccur at the end of the procedure due to removal of the trocar.

- It is important to identify such events which can be effectively dealt with via electrocoagulation or suture,

- Postoperative bleeding complications involve cases of cystic artery damage, prolonged haemorrhage from the gallbladder bed , parenchymal liver injuries and also trocar channel bleedings.

- Causes can be attributed to insufficient clipping, slipped clips, inadequate diathermy or to the fact that the decrease of intraabdominal pressure at the end of the procedurecan lead to a re-opening of compressed vesselsand to new bleeding as a consequence

Bile Duct Injuries

- Several description and classification systems (such as Bisthmus class. Or Strasberg class.)

- Bile duct injuries must be viewed as potentially very severe complications bearing high morbidity, long-term hospitalization, disease chronification and possibly life threatening

- The most frequentThe most frequent mechanism of injury ismechanism of injury is mistaking a major bile ductmistaking a major bile duct for the cystic duct andfor the cystic duct and clipping and cutting itclipping and cutting it

Bisthmus class

- **Type 1 injury:** 2 cm. or more of the common hepaticType 1 injury: 2 cm. or more of the common hepatic duct is preserved below the bifurcationduct is preserved below the bifurcation
- **Type 2 injury:**less than 2 cm. remainsType 2 injury :less than 2 cm. remains
- **Type 3 injury:**injury reaches the bifurcation withType 3 injury : injury reaches the bifurcation with preservation of the continuity between the right and leftpreservation of the continuity between the right and left ductsducts ν Type 4 injury : involves destruction of the hepatic duct
- **Type 4 injury:** involves destruction of the hepatic duct confluence with separation of the right and left hepaticconfluence with separation of the right and left hepatic ductsducts
- **Type 5 injury:** involves injury of a separate inserting rightType 5 injury : involves injury of a separate inserting right sectorial duct with or without common duct injurysectorial duct with or without common duct injury

factors involved in the occurrence of bile ductfactors involved in the occurrence of bile duct injuries during laparoscopic cholecystectomy

- acute or chronic inflammation, obesity, anatomic variations, andacute or chronic inflammation, obesity, anatomic variations, and bleedingbleeding
- The bile duct injury rate is increased in patients with complicationsThe bile duct injury rate is increased in patients with complications of gallstones, including acute cholecystitis, pancreatitis, cholangitis,of gallstones, including acute cholecystitis, pancreatitis, cholangitis, and obstructive jaundiceand obstructive jaundice.
- Surgeon training and experienceSurgeon training and experience.. As surgeon experience increasesAs surgeon experience increases beyond 20 cases, the bile duct injury rate decreasesbeyond 20 cases, the bile duct injury rate decreases
- Recent reports have indicated that errors leading to laparoscopicRecent reports have indicated that errors leading to laparoscopic bile duct injuries from misperception, not errors of skill, knowledge,bile duct injuries from misperception, not errors of skill, knowledge, or judgmentor judgment.. The primary cause of error in 97% of cases was aThe primary cause of error in 97% of cases was a visual perceptual illusion, whereas only 3% of injuries were due tovisual perceptual illusion, whereas only 3% of injuries were due to faults of technical skill.faults of technical skill.

Presentation

- Patients with bile duct injuries can presentPatients with bile duct injuries can present intraoperatively, in the early postoperative period, orintraoperatively, in the early postoperative period, or months or years after the initial injurymonths or years after the initial injury.
- About 25% of major ductal injuries are recognizedAbout 25% of major ductal injuries are recognized intraoperatively because of bile leakage, an abnormalintraoperatively because of bile leakage, an abnormal cholangiogram, The most common presentation of acholangiogram, The most common presentation of a complete occlusion of the common hepatic or bile ductcomplete occlusion of the common hepatic or bile duct isis jaundice with or without abdominal painjaundice with or without abdominal pain.
- Patients may also present months or years after surgeryPatients may also present months or years after surgery with cholangitis or cirrhosis secondary to a biliary tractwith cholangitis or cirrhosis secondary to a biliary tract injury

Diagnosis andDiagnosis and Management

- Isolated, small , partial lateral bile duct injuryIsolated, small , partial lateral bile duct injury recognized at time of cholecystectomy can berecognized at time of cholecystectomy can be managed with placement of a T tubemanaged with placement of a T tube.

- However, if the biliary injury is more extensive,However, if the biliary injury is more extensive, or if there is significant thermal damage owing toor if there is significant thermal damage owing to cauterycautery--based trauma, or if the injury involvesbased trauma, or if the injury involves more than 50% of the circumference of the bilemore than 50% of the circumference of the bile duct wall, an endduct wall, an end--toto--side choledochojejunostomyside choledochojejunostomy with a Rouxwith a Roux--enen--Y loop of jejunum should beY loop of jejunum should be performedperformed.

- Similarly, major bile duct injuries, includingSimilarly, major bile duct injuries, including transections of the common bile ortransections of the common bile or common hepatic duct, can be repaired ifcommon hepatic duct, can be repaired if recognized at the time of cholecystectomyrecognized at the time of cholecystectomy.
- Isolated hepatic ducts smaller than 3 mmIsolated hepatic ducts smaller than 3 mm or those draining a single hepatic segmentor those draining a single hepatic segment can be safely ligatedcan be safely ligated.
- Ducts larger than 3 mm are more likely toDucts larger than 3 mm are more likely to drain several segments or an entire lobedrain several segments or an entire lobe and need to be reimplantedand need to be reimplanted.

- Eric muhe performed theEric muhe performed the first laparoscopicfirst laparoscopic cholecystectomy in germanycholecystectomy in germany in 1985in 1985

- Nowadays more than 90% of the elective cholecystectomies are performed laparoscopically.

- Although laparoscopic cholecystectomy has become the gold standard of treatment it does not preclude complications, whether major or minor.

- The operative removal of the gallbladder is a standard and one of the most often performed procedures in general surgical departments.

- The operation is indicated in - cases of gallbladder stones creating symptoms - cases of acute infection of the gallbladder with or without stones - cases of adenomatous structures in the gallbladder that may develop malignity