

SURGICAL INJURIES OF THE COMMON
BILE DUCT AND THEIR MANAGEMENT

Essay

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By

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Introduction

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Injury of the extrahepatic biliary tract is a catastrophic possibility for every patient undergoing gall-bladder surgery, or surgery nearby.

Operative injuries of the bile ducts usually have serious consequences in terms of morbidity and ultimate mortality. The life of these patients is usually one of considerable distress, unless correct treatment is instituted.

The magnitude of the tragedy is made greater by the knowledge that most of these operative accidents are preventable.

A review of the literature from centers in which the surgery is usually performed by qualified surgeons shows that the incidence of the bile duct injury is about one in 300 cholecystectomy operation.

The aim of this essay is to review the different types of injuries to the common bile duct during surgical procedure.

To be able to approach this subject the embryology and anatomy will be reviewed. The incidence, aetiology, diagnosis and treatment will be discussed.

Embryology

EMBRYOLOGY

During the third or fourth week of embryogenesis, an endodermal bud-like ventral projection originates at the junction between the foregut and mid gut. (Arey, 1965).

This diverticulum, then divides into cephalic (Pars Hepatica) and Caudal (Pars Cystica) projections. That portion of the diverticulum, common to the cephalic and caudal projections form the common bile duct. (Fig. 1). Then the cephalic projection gives rise to the hepatic ducts, while the caudal one forms the cystic duct and the gall-bladder. Bridges of hepatic elements may connect the pars Hepatica and pars cystica (Hayes, 1958).

The endodermal cells capping the cephalic diverticulum differentiate into plates of hepatocytes which surround a vascular plexus arising from the vitelline vein. The hepatic diverticulum then penetrates the transverse septum as a solid cord of hepatic cells (Willson, et al 1963). Cords of two cells in thickness give rise to the hepatic parenchyma

and the intercellular bile canaliculi, while cords of four or five cells in thickness become ductal cells forming the intralobular ductules which converge to form the interlobular ducts, these then connect with the extrahepatic ducts that are developing from the original cephalic diverticulum. Aberrant bile ducts may form during the development of proliferating branches of the primitive tubular liver cords.

Early in their development from the hepatic diverticulum, the common and hepatic bile ducts become solid structures containing multiple spaces lined with epithelial cells. Later, about the seventh week, these spaces coalesce to form the lumen of the ducts (Elias, 1955). The common bile duct acquires its lumen first followed by the cystic duct, which then expands at its distal end to form the definitive gall-bladder.

Accessory ducts, or biliary atresia, may result if this process of solidification and vacuolization is aborted at certain developmental stages. At three months the fetal liver begins to secrete bile (Jackson, 1964).

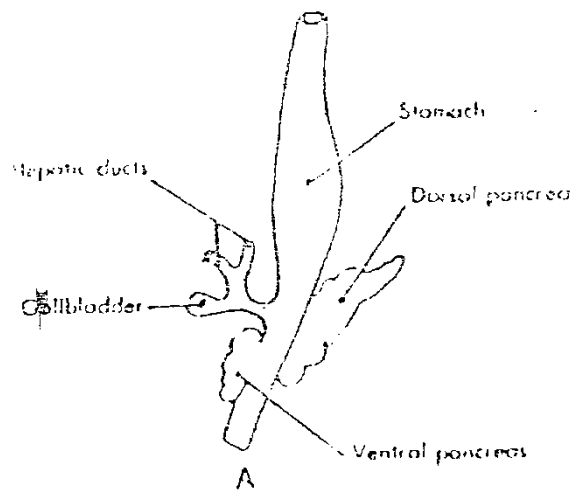


Fig. (1): Development of the biliary tract.

Anatomy

ANATOMY OF THE BILIARY APPARATUS

Gall-bladder:

The gall-bladder is a pear-shaped sac, located in a fossa on the inferior surface of the right hepatic lobe, extending from near the right extremity of the porta hepatis to the inferior border of the liver. It is about 7 cm long, with a normal capacity of about 30-50 ml, and is divided into four anatomic portions: Fundus, body, infundibulum and neck.

The fundus or expanded, rounded, blind ended is directed downwards, forwards and to the right. It may or may not project beyond the inferior border of the liver in the region of the ninth costal cartilage, where the outer margin of the rectus sheath meets the costal margin. It contains most of the smooth muscles of the organ.

The body is directed upwards, backwards and to the left, near the right end of porta hepatis, then it narrows to form the neck. It is the major storage area and contains most of the elastic tissue. Its upper surface is related to the liver, its under

surface to the right part of the transverse colon and further back to the superior part of duodenum and the upper end of the descending part.

The neck is narrow, funnel shaped and lies in the free border of the hepatoduodenal ligament. It curves upwards and forwards, then turns abruptly backwards and downwards, and becomes continuous with the cystic duct. At its point of continuity with the cystic duct, there is a constriction. The neck is attached to the liver by areolar tissue, in which the cystic artery is embedded. The right wall of the neck of the gall-bladder may show a small diverticulum directed downwards and backwards known as the infundibulum or Hartmann's pouch.

The gall-bladder is covered with peritoneum, except for the surface that is in direct contact with the liver.

Hepatic ducts:

The intrahepatic biliary ducts of the two left lobe segments unite to form the left hepatic duct. The ducts from the two right lobe segments unite to form the right hepatic duct. The right

and left hepatic ducts join, about 1-2 cm below the porta hepatis to form the common hepatic duct. The common hepatic duct, with a length of 2-4 cm and an internal diameter of about 8 mm (two times the hepatic duct), lies in the right free margin of the lesser omentum, towards the right and in front of the portal vein, and with the hepatic artery proper on its left. The right branch of the hepatic artery commonly passes behind the common hepatic duct.

Cystic duct:

The cystic duct is the continuation of the neck of the gall-bladder. It is a narrow tube commonly about 4 cm long with an internal diameter of 2-3 mm. It passes backwards, downwards and to the left to join the common hepatic duct about 3 cm below the porta hepatis forming the common bile duct. It runs parallel with and adheres to the common hepatic duct for a short distance before joining it. This junction may be at a considerably lower level. The cystic artery commonly runs behind the cystic duct.

Common bile duct:

The common bile duct is about 7-8 cm long

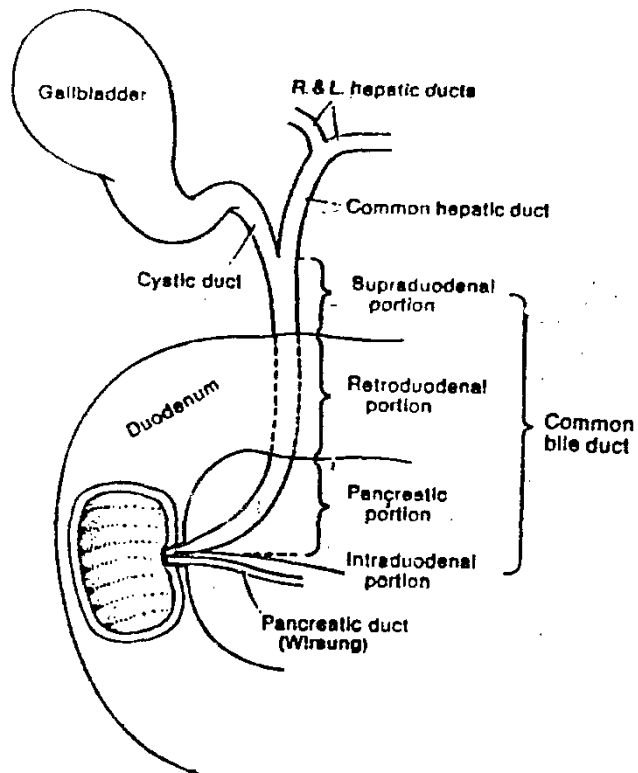


Fig. (2): The extrahepatic biliary tract and the four portions of the common bile duct (Schwartz, 1985).