Risk Factors and Predictors of Post-ERCP Complications

Thesis
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By

Mohamad Omar Khalifa
M.B., B.Ch, M.Sc.
Faculty of Medicine – Ain Shams University

Supervised by

Prof. Maamoun Mohamad Ashour
Prof. of Tropical Medicine
Faculty of Medicine – Ain Shams University

Prof. Abd El-Fattah Abd El-Salam Abd El-Fattah
Prof. of Internal Medicine
Faculty of Medicine – Ain Shams University

Prof. Mohamad Reda Mahmoud El Wakil
Prof. of Tropical Medicine
Faculty of Medicine – Ain Shams University

Dr. Mohamad Shaker Ghazy
Lecturer of Radio-Diagnosis
Faculty of Medicine – Ain Shams University

Faculty of Medicine
Ain Shams University
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List of abbreviations

ARDS	Adult respiratory distress syndrome
ALT	Alanine aminotrasferase
ASA	The American Society for Anesthesiology
ASGE	The American Society for Gastrointestinal Endoscopy
AST	Aspartate aminotransferase
CBD	Common bile duct
CHD	Common hepatic duct
CLD	Chronic liver disease
CT	Computed tomography
DDAVP	Desmopressin (١-deamino-٨-D-arginine vasopressin)
EBD	Endoscopic balloon dilation
EHL	Electrohydraulic lithotripsy
ERCP	Endoscopic retrograde cholangiopancreatography
ES	Endoscopic sphincterotomy
ESWL	Extra-corporeal shock wave lithotripsy
EUS	Endoscopic Ultrasound
F	١ F (French) = ٠,٣٣ mm
GB	Gall bladder
G-٦-PD	Glucose ٦ phosphate dehydrogenase
HFLs	Hepatic focal lesions
HIV	Human immunodeficiency virus
ICLL	Intra-corporeal laser lithotripsy
ICU	Intensive care unit
INR	International normalized ratio
IV	Intravenous
MRCP	Magnetic resonance cholangiopancreatography
MTBE	Methyl– tertiary –butyl–ether
MUSC	Medical University of South Carolina

NIH	National Institute of Health
NSAIDs	Non steroidal anti-inflammatory drugs
OR	Odds ratio
PD	Pancreatic duct
PTC	Percutaneous trans-hepatic cholangiography
SOD	Sphincter of Oddi dysfunction
SOM	Sphincter of Oddi manometry

Introduction

Endoscopic retrograde cholangiopancreatography (ERCP) is widely used in the diagnosis and treatment of biliary and pancreatic disorders. Getting directly into the common bile duct (CBD) is the most important step for successful therapeutic endoscopy. The cannulation success rate depends on patient selection, the utilization of specialized catheters, and the skill and experience of the endoscopist ***(Zhou et al., ٢٠٠٦).***

ERCP is a technically demanding endoscopic procedure that varies from a simple diagnostic to a highly complex therapeutic procedure. It has variable degrees of technical success and variable rates of complications**.** The common complications of ERCP are pancreatitis, hemorrhage, perforation and infection ***(Ragunath et al., ٢٠٠٣).***

Many risk factors affecting the incidence of post-ERCP complications are identified; these may be related to the technique, the patient or to the experience of the endoscopist ***(Suissa et al., ٢٠٠٥).***

In order for endoscopists to accurately assess the clinical appropriateness of ERCP, it is important to have a thorough understanding of the potential complications of this procedure.

Numerous recent studies have helped determine the expected rates of complications, potential contributing factors for these adverse events, and possible methods for improving the safety of ERCP ***(Mallery et al., ٢٠٠٣).***

Aim of the work

The aim of this study is to:-

Prospectively evaluate the frequency of post-ERCP complications in Ain Shams University Hospitals and to identify the risk factors and predictors of each complication.

Anatomy of the biliary system

Understanding the biliary and pancreatic tracts anatomy is essential for radiologists, endoscopists and others who are involved in the diagnosis and treatment of the biliary and pancreatic diseases ***(Pelligrini and Duh, ١٩٩١).***

Embryological development of the liver and bile ducts:-

The liver begins as a hollow endodermal bud from the foregut (duodenum) during the third week of gestation. The bud separates into two parts; hepatic and biliary.

The hepatic part contains bi-potential progenitor cells that differentiate into hepatocytes and ductal cells, which form the early primitive bile ducts structures (bile canaliculi of the liver and the hepatic ducts). Normally, this collection of rapidly proliferating cells penetrates adjacent meso-dermal tissue (the septum transversum) and is met by ingrowing capillary plexuses from the vitelline and umbilical veins which will form the sinusoids ***(Van-Eyken & Desmet, ١٩٩٣).***

Then the biliary part of the endo-dermal bud will form the gall bladder and extra-hepatic bile ducts; no sooner does the cystic diverticulum (which will form the gall bladder and cystic duct) appear than cells at the junction of the hepatic and cystic

duct proliferate and form the common bile duct. Bile begins to flow at about the ١٢th week ***(Larsen, ١٩٩٨).***

Intra-hepatic biliary tree and bile canaliculi:-

The first bile canaliculi appear between parenchymal cells of the sixth-week embryo. During the sixth to ninth weeks, the remainder of the intra-hepatic biliary tree begins to form, apparently derived from limiting plate hepatocytes abutting the edges of the portal canals. Bile production commences after four months of gestation. The bile flows into the gall bladder and then to the duodenum, producing the characteristic dark color of the meconium ***(Jones, ١٩٩٦).***

The individual biliary drainage system is parallel to the portal venous supply ***(Mortele and Ros, ٢٠٠١).*** The right hepatic duct drains the segments of the right liver lobe (V-VIII) and has two major branches: the right posterior duct draining the posterior segments, VI and VII, and the right anterior duct draining the anterior segments, V and VIII. The left hepatic duct is formed by segmental tributaries draining segments II-IV ***(Blumgart and Hann, ٢٠٠٠).*** The caudate lobe is usually drained by several small ducts joining the origin of the left or right hepatic duct ***(Mortele and Ros, ٢٠٠١).***

Bile ducts and ductules; the smallest branches of the biliary tree are the bile canaliculi. Bile proceeds down the bile

canaliculi, moving from the centrilobular cells toward the perilobular or interlobular portal triads, i.e. from zone (٣) to zone (١). The canalicular bile then enters the small terminal bile ductules, or canals of Hering ***(Jones, ١٩٩٦)***.

The walls of the intra-hepatic bile ducts are made up of dense fibrous tissue containing many elastic fibers. Smooth muscle fibers surrounding the walls of the ducts are found near the hilus of the liver and form the morphologic basis for the narrowing of the ducts in this location often seen on cholangiograms. Occasionally, areas of mucus-secreting epithelium surrounded by a vascular plexus been observed in larger ducts ***(Benedetti et al., ١٩٩٣).***

Bile ducts are usually located above the corresponding portal branches, whereas hepatic arterial branches are located inferior to the veins. The right liver and the left liver are respectively drained by the right and left hepatic ducts, which converge at the liver hilus to the common hepatic duct. All these biliary and vascular elements are liable to anatomical variations ***(Smadja and Blumgart, ٢٠٠١).***