THE ROLE OF LAPAROSCOPY AS A DIAGNOSTIC AND THERAPEUTIC PROCEDURE IN BILIARY SURGERY

ESSAY

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Master Degree In General Surgery

By

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قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ.

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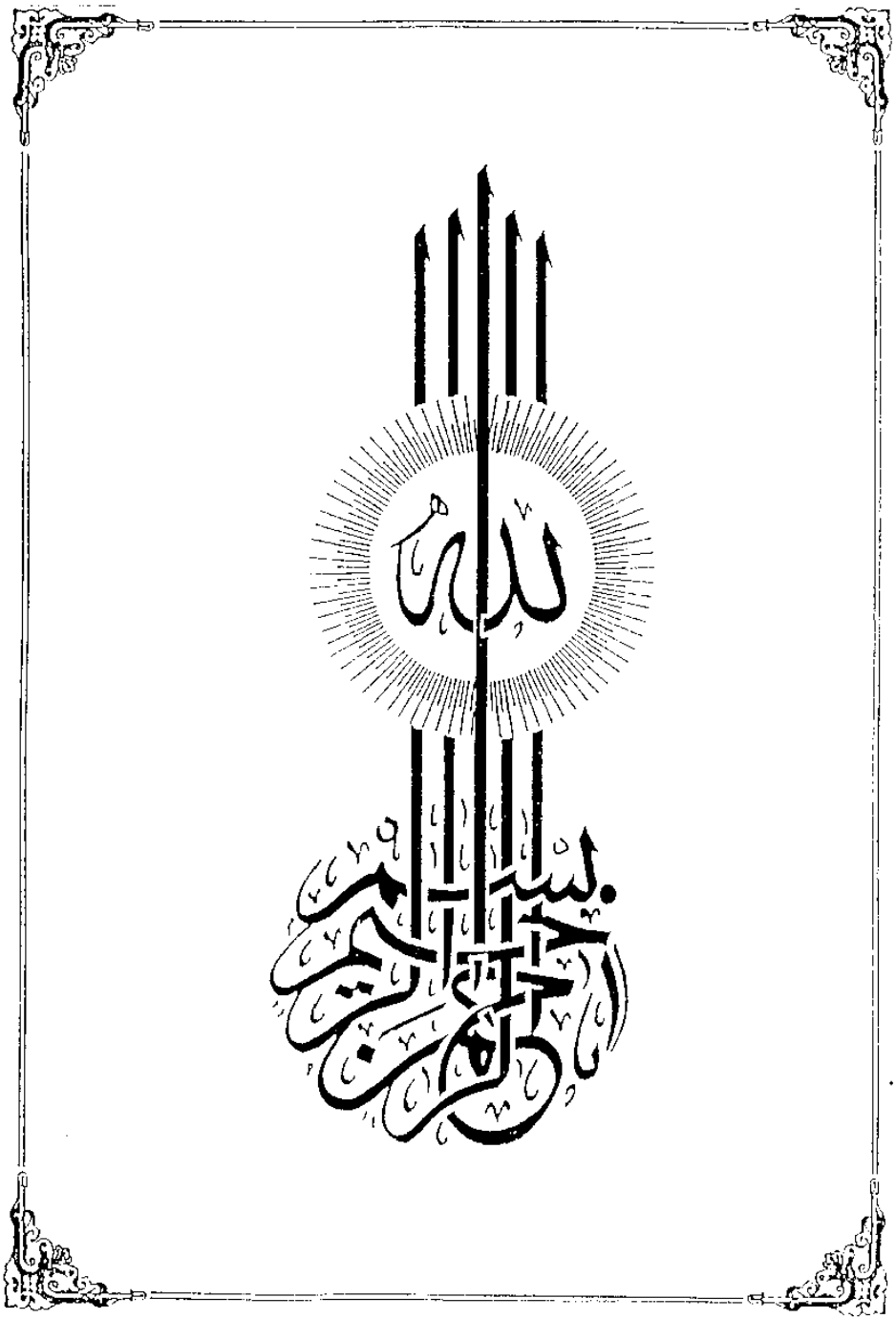

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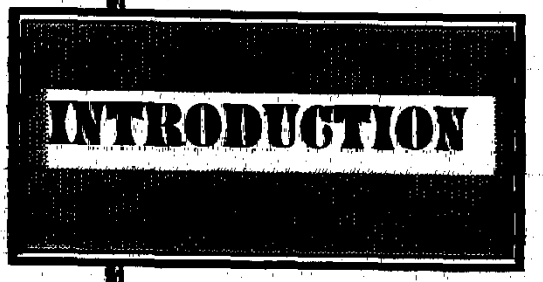


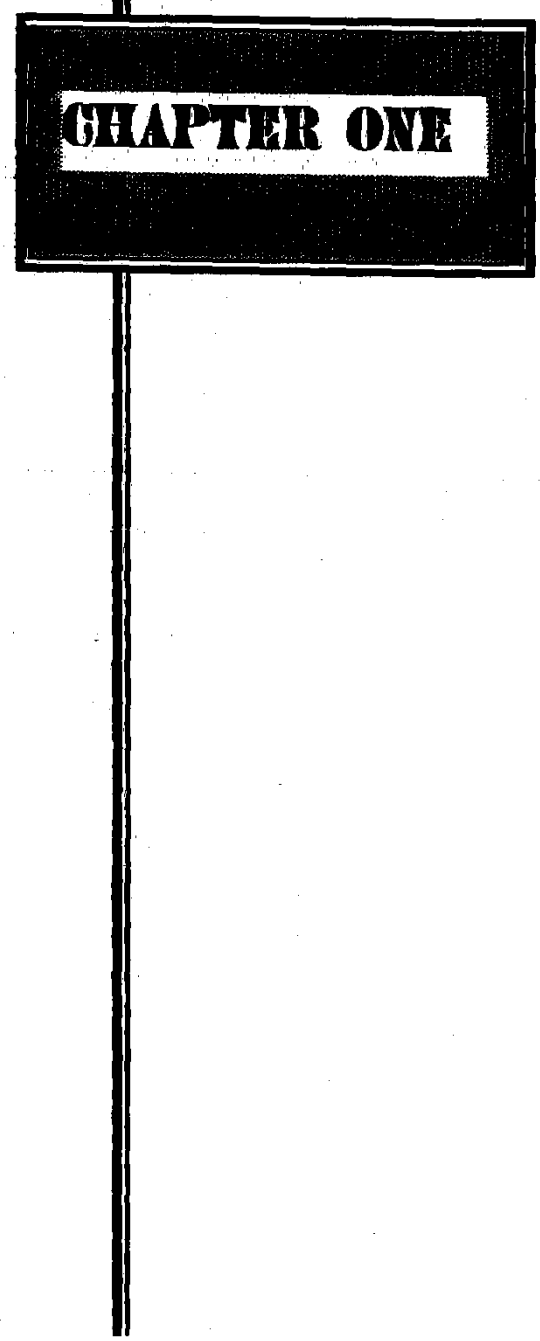
INTRODUCTION

Biliary stone diseases represent a major medical and economic problem. It has been estimated that gall stones present in approximately fifteen to twenty percent of adults. Cholecystectomy remains the standard method of treating symptomatic biliary stone diseases.

Laparoscopy has been utilized widely for both diagnostic and therapeutic procedures of a broad aspects of diseases, especially, laparoscopic cholecystectomy which now has been an excellent therapeutic tool.

The history of laparosopic surgery dates since 1960s when Hulka et. al., published the series of laparoscopic surgical intervention and equipment.

This work aims at the study of the laparoscopic principles and the technique of laparoscopic cholecystectomy with giving a light on the difficulties and limitations of the technique as well as the possible complications and the way of their management with a brief comparison between open and laparoscopic cholecystectomy.



CHAPTER ONE

LAPAROSCOPIC PRINCIPLES

AND TECHNIQUE

HISTORICAL ASPECTS:

The Arabian physician Aboulkassim (963-1013) is often credited with being the first to use reflected light to inspect an internal organ. The first discription of endoscopic inspection of the abdominal cavity was in 1901 by Kelling, who used a Nitze cystoscope (Gunning, 1977; Filipi et. al., 1991).

A major advance was obtained in 1952 when Fourestier et. al., converted from the distal to the proximal light projection system. In the same year, Hopkins and Kapny introduced fibroptics (Gunning, 1977).

During the late 1960s and 1970s. Steptoe, Hulka et. al., and Semm published extensively on laparoscopic surgical intervention and equipment. They are considered by many as leading pioneers of modern laparoscopic surgery (Hulka, 1985).

The first laparoscopic procedure performed by general surgeons appears to have been liver biopsy guided under direct vision. Clinical investigators rapidly recognized the versatility of this procedure in obtaining tissue from other areas of the abdominal cavity (Warshaw et. al., 1986).

Instruments and Technical principles:-

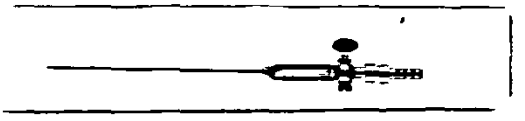
Several types of nonoptical equipment are essential for endoscopic surgery. These instruments include(1) devices for induction of pneumoperitoneum,(2) cannulas and trocars for introduction of the laparoscope and ancillary surgical instruments,(3) hemostatic and dissection devices including lasers or electrocautery, and (4) irrigation - aspiration system to maintain a meticulous surgical field. In addition, surgical instruments that have been designed for specific function should be carefully selected prior to each procedure. (Gadacz et. al., 1990; Reddick and Olsen, 1990).

The separation of intracavitary organs from the body wall by the introduction of gas in the abdomen (this is called pneumoperitoneum) is fundamental for successful visulaization of organs and structures during endoscopic surgical procedures. A variety of gases (Carbon di oxide, nitrous oxide, room air) each having specific advantages and liabilities (Neely et. al., 1975; Sharp et. al., 1982).

Instruments:-

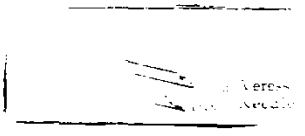
The Veress needle and the Foures-kuss needle are available to facilitate the creation of pneumoperitoneum. The Veress needle was initially used for the induction of a pneumothorax in tuberculous lung. This device is now used almost exclusively in abdominal endoscopic procedures to produce a pneumoperitoneum (Stanley, 1991) *(Fig. 1. a,b)*.

The Veress cannula is a clever doublebarreled device consisting of an inner, blunt-shaped; spring action stylet and an outer, sharply bevelled



(a)

The Veress needle



(b)

The working end

Fig. 1. : a. (Cuschieri and Berci, 1990).
b. (Bruce et. al., 1991).

needle. The outer needle perforates the facial planes, and the blunt ended, inner stylet protrudes following advancement of the needle through ressistant tissues to push aside any freely mobile intra-abdominal structures (Stanly, 1991) ***(Fig. 2)***.

The Veress needle is manufactures in both reusable and disposable forms in several diameters and lengths. The external diameter of the most commonly used needle is 2.1 mm (14 gaug); needles with 1.7 mm and 2.5 mm outer dimentions are also available knowledge of the type of needle used is essential to enable accurate interpretation of the intra-abdominal pressure measured during gas insufflation. A smaller-internal diameter needle has increased resistance to gas flow and produces an increased recording of intra-abdominal pressure while gas is being introduced. In contrast, larger-bore needles produce the opposite effect. Veress needles that have two ports (one for the introduction of gas and one for pressure recording) enable the operator to measure intraperitoneal pressures accurately during insufflation (Rodney and Stanley, 1991).

A cannula is a hollow tube with a valve mechanism that is placed into a body cavity by passing a cutting-tipped rod (trocar) through the lumen in the cannula. Following penetration of the body wall, the trocar is removed, and the cannula lumen is used to introduce other surgical devices. Both cannulas and trocars are manufactured in reusable and disposable versions, each type having advantages (Rodeny and Stanley, 1991) ***(Fig. 3) (Plate. I)***.

Reusable cannulas are available in diameters from 3 to 12 mm. Concentric reducing cylinders can be used to diminish the internal diameter of the reusable cannula to enable placement of smaller-diameter

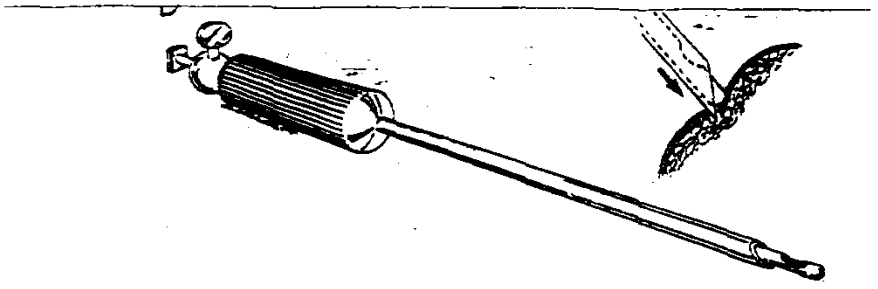


Fig. 2 : The Veress needle mechanism during tissue penetration.
(Rodney and Stanley, 1991)

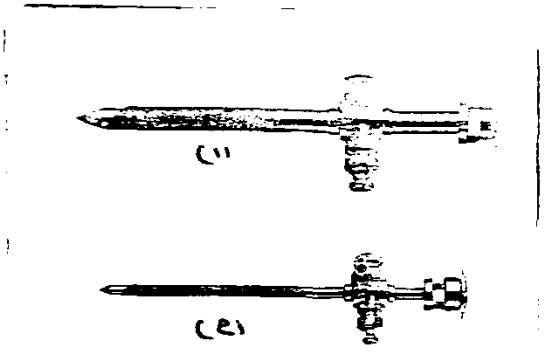


Fig. 3 : (1) 11 mm trocar
(2) 5.5 mm trocar
(Cuschieri and Berci, 1990)

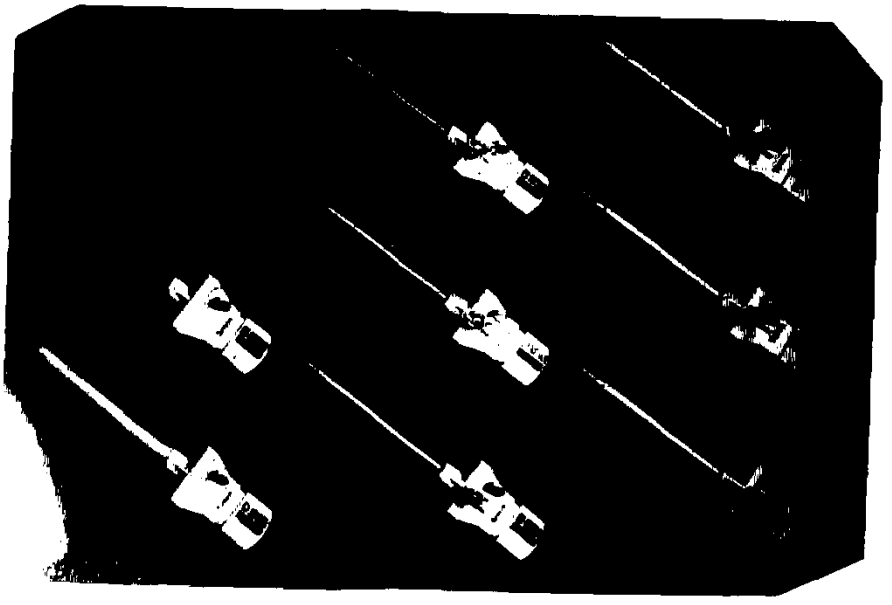


Plate I. : Disposable trocar / Cannulae

instrumentation and prevent leakage of insufflated gas. The internal diameters of available disposable cannulas are adjusted by silicon reducing gaskets that are attached at the entry orifice. Disposable non metallic cannulas permit unobstructed intra operative X-ray contrast studies such as cholangio graphy because they avert images in the field produced by metallic devices (Rodney and Stanley, 1991).

Cannulas are equipped with one of two types of valves to prevent a loss of insufflation gas. Trumpet valves are depressed by means of an external plunger permitting passage of laparoscopic endoscopes and instruments. Trapdoor or flap valves automatically open when a laparoscope or other instruments are passed through the lumen of the cannula. Both types of valves work equally well, but regular maintenance in reusable cannulas is required to ensure uninhibited movement. Available disposable cannulas use the trapdoor-type valve to obtain a gas seal. Virtually all available cannulas are fitted with a side luer-lock connector for attachment of gas tubing from the insufflator. Additional gas may be insufflated directly through the cannula luer-lock during the procedure in order to maintain the operative field (Phillips et. al., 1990).

To enable penetration of the abdominal wall, a cannula has a slightly tapered end that fits snugly around the trocar. Trocar tips have either a pyramidal or conical shape. The pyramidal tip is preferable, because of its three sharpedges, less force is required to pass the trocar through various tissue layers into the abdominal cavity. Trocar tips must be kept sharp as dull trocars and conical-tip trocars require greater force to penetrate the abdominal wall. The greater the force, the greater the risk of sudden, un controlled entry and damage to the viscera (Phillips et. al., 1990) ***(Fig. 3, 4, 5)***.