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THE ROLE OF LAPAROSCOPY IN GENERAL SURGERY

ESSAY

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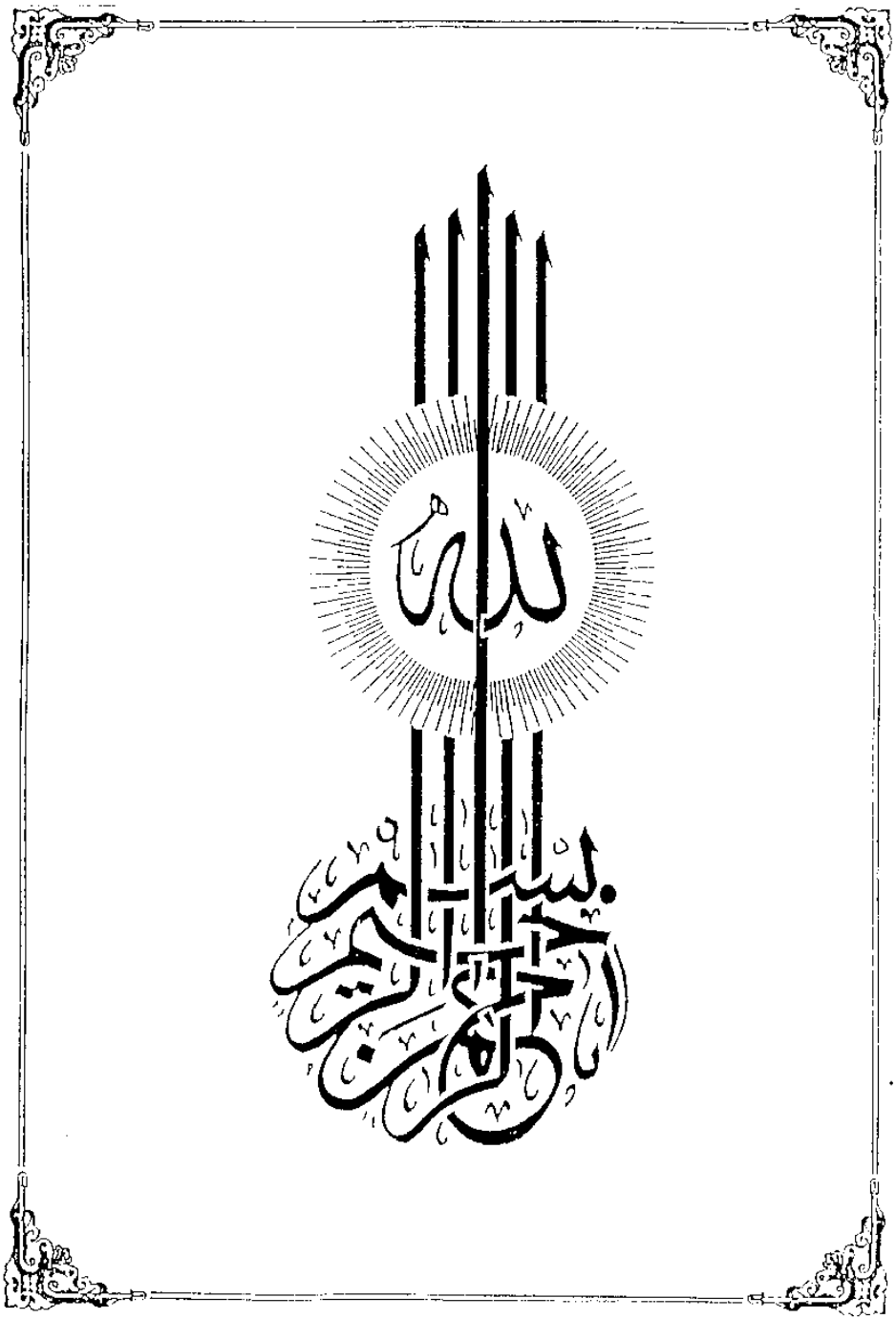

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INTRODUCTION

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AIM OF THE WORK

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Since the beginning of the 20th century physicians promoted laparoscopy as a valuable adjunct to the diagnosis of diseases of the abdominal cavity. Laparoscopy however failed to become popular among abdominal surgeons until the advent of laparoscopic cholecystectomy, this new operative approach to the treatment of gallstones gave rise to such enthusiasm among general surgeons that other innovative laparoscopic procedures are now being promoted in ever increasing numbers, the general surgeon has again become the leader in the introduction of a new surgical approach (**Nagy *et al* , 1992**).

Minimal access surgery is intended to minimize the trauma of access without compromising exposure of the operative field, its major benefits include diminished cost of therapy due to a reduced hospital stay with early return to full activity, the approaches used in minimal access surgery are laparoscopic, endoluminal, perivisceral, intra-articular and combined, many abdominal and thoracic procedures are being adapted to the minimal access approach (**Cuschieri, 1991**).

Training of residents in laparoscopic surgery is not very different than that for other general surgical procedures, initial training involves didactic instruction through laparoscopic surgical atlases and educational videotapes, further training uses a simulation device which enables the trainee to practice techniques of laparoscopic suturing, knot-tying and

clip application, actual operative experience is acquired primarily in experimental animal preparations, further clinical experience can be acquired by assisting on several laparoscopic operations, usually involving diagnostic or pelvic procedures, actual operative experience comprises the final phase of the educational program, the introduction of clinical laparoscopic training into general surgery residency programs should influence the widespread adoption of this new procedure (**Bailey, *et al* 1991**).

Aim of The Work :

To review the role of laparoscopy in General Surgery as regards to historical aspects, instrumentation, diagnostic laparoscopy, therapeutic laparoscopic procedures including laparoscopic cholecystectomy, laparoscopic gastric operations, laparoscopic management of hiatal hernia laparoscopic appendectomy and giving an idea about complications and advantages of laparoscopic surgery.

HISTORICAL ASPECTS

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Laparoscopic surgery has been the most significant advance in general surgery in recent years.

Credit for the origin of laparoscopy is usually given to George Kelling, who was the first to examine the abdominal cavity with an endoscope (**Thomas, 1992**), this milestone reported in 1901, was performed in a live dog using a cystoscope. In this first laparoscopy, air was introduced through a puncture needle to produce a pneumoperitoneum and the cystoscope (laparoscope) was introduced through a larger trocar, thus although the instruments were primitive, the principles were correct and Kelling established the feasibility of direct visualization of the abdominal cavity.

In 1901, Dimitri Ott, a Russian Gynecologist, described a technique for directly viewing the abdominal cavity through incision in either the abdominal wall or the vagina and reflecting light into the abdomen from a head mirror, he termed his procedure "*Ventroscopy*" (**Thomas , 1992**).

Although Kelling later reported experience in humans, the first major series of laparoscopies in man is attributed to H.C. Jacobaeus reported in 1991, Jacobaeus efforts were not confined to examining the abdomen but also the thorax, he advised methods to examine both of these cavities and coined the term "*Laparothorakoskopie*". It was in 1910

that Jacobaeus first suggested in a brief report the possibility of examining body cavities endoscopically (**Thomas , 1992**).

In 1914 Roccavilla of Italy described a modified method of Kelling and Jacobaeus. He designed an instrument that permitted the source of light to remain outside the abdomen, a strong beam of light was directed by reflection into the trocar tube (**Cohen , 1970**).

In 1924, Zollikofer of Switzerland introduced the use of carbon dioxide as the gas of choice for insufflation because it is easily and quickly absorbed (**Nadeau *et al*, 1925**).

Kalk (from Germany), was a most outstanding of peritoneoscopy. He advised a new system of lenses that produced a foroblique (135 degrees) viewing system, he used a pneumoperitoneum needle. In 1929 he reported his experience with 100 laparoscopic examinations and described his own instrument and technique (**Wittman , 1966**).

Operative procedures combined with endoscopy was reported in 1933 by Fervers, who burned abdominal adhesions and excised tissue under direct visualization (**Wittman, 1966**).

In 1925 a new apparatus was developed by Fourestier, Gladu and Valmiere, revolutionized endoscopic technique (**Steptoe, 1967**), they developed a method of transmitting an intense light from the proximal to the distal end of the telescope, this immediately removed the dangers

of accidents due to electrical faults and heat, and allowed intense light to be concentrated so that photographs could be taken.
Endoscopic colour films were produced, and in 1929 a closed circuit television program was first produced, by using the apparatus of Fourestier, Gladu and Valmiere (**Cohen, 1970**).

Kurt Semm described technique most commonly associated with operative laparoscopy, his endocoagulator allowed a safe means of controlling blood loss when performing laparoscopic surgery to treat endometriosis, pelvic adhesions and removal of ovarian cysts and when performing salpingostomies (**Semm , 1974**).

In the early 1980s, the laser was added to the surgical armamentarium, **Bruhat (1980)**, **Tadir (1981)** and **Daniell *et al* (1981)**, initially described the use of carbon dioxide laser (**Daniell , *et al* 1982**).

Laparoscopic visualization of the abdominal cavity was restricted to the individual directing the operation and participation by other members of the surgical team was thus limited, so it is safe to say that the development of operative laparoscopy would not have been possible without the video laparoscopic camera. This instrument has allowed all members of the operating team to view the operative field simultaneously, permitting the type of coordinated movements required for more complex operative procedures (**Berci *et al*, 1986**).

One of the primary problems in the development of laparoscopic video imaging was insufficient illumination, this problem has largely been eliminated by the introduction of the high intensity xenon light source as well as with the development of the larger laparoscopes with the ability to transmit more light (**Satava *et al*, 1988, 1989**).

The origin of modern laparoscopic surgery is derived from the Kiel school headed by Semm, the basic instrumentation and the heater probe were developments which emanated from this centre. Semm also added important refinements to the existing insufflators which led to the modern electronic insufflator capable of variable flow with automatic feedback controlling the insufflation to maintain a preselected intra abdominal pressure. Semm's contribution extended beyond this, however because he pioneered the basic surgical skills of laparoscopic dissection, ligation and suturing. The basic technique of laparoscopic appendicectomy including extraction of the organ without recourse to minilaparotomy, was developed by Semm and his group in kiel (**Cuschieri *et al*, 1992**).

Laparoscopic guided gall stone clearance was first performed in animal model by Frimberger in Germany in 1979. Experimental laparoscopic biliary surgery was started in Dundee by **Cuschieri and El-Ghany in 1985**. The work involved laparoscopic ligation of the cystic duct, cholecystostomy and dissection of the gall bladder. This led to cholecystectomy in the pig which was performed by **Nathanson and Cuschieri** in **1987** and **Ko *et al*** in **1988**. Although Mouret, in Lyon was the first surgeon to perform the operation in the human using

standard laparoscopic equipment in 1987, the procedure had been previously introduced into clinical practice in 1985 by Muehe, a surgeon from Boblingen, using a modified rectoscope with an optic and CO_2 insufflation, the first published report using the standard multipuncture technique was by **Dubois in 1989**.

Disorders of the appendix has been diagnosed laparoscopically since the early days of laparoscopy, when rigid cystoscopes were first introduced into the abdomen. The first specialists to utilize this technology for the removal of the organ were gynecologists, led to Kurt Semm in Germany (**Semm, 1983**).

Incidental appendectomy was most often performed in conjunction with other pelviscopic procedures. This was considered justifiable to avoid future diagnostic confusion and the possible morbid complications of acute appendicitis.

The incorporation of laparoscopic techniques in the exponding repertoire of the general surgeon followed the introduction of laparoscopic cholecystectomy in Europe and the United States.

LAPAROSCOPIC INSTRUMENTATION

INSTRUMENTATION AND EQUIPMENT FOR ENDOSCOPIC SURGERY

The popularity of laparoscopy for diagnostic and therapeutic procedures is mainly due to technological advances made over the last few decades (**Epstein, 1980**). The surgeon must master the tools he utilizes, complete understanding of the advantages , limitations and common pitfalls of each device may prove pivotal to a successful outcome of any procedure.

Equipment Organization :

Endoscopic surgery is best performed in a room large enough to accommodate several tables to position essential equipment. The organization of the operating room is dependent upon the nature of the procedure and the surgeon's position at the operating table (**Reddick *et al* , 1989**).

Room organization may be different when lower abdominal surgery is performed, the monitor is being placed at the foot of the operating table rather than at the head of the table as it is during most procedures (**Hulka, 1985**).

Various structures are visualized during intra abdominal procedures with the patient in different positions. The pelvic organs are best approached and completely visualized with the patient in the Trendelenburg position, whereas the upper abdominal structures required the patient to be in the Fowler (head up) position with varying