Stapling Techniques in Gastro - Intestinal Surgery

Essay
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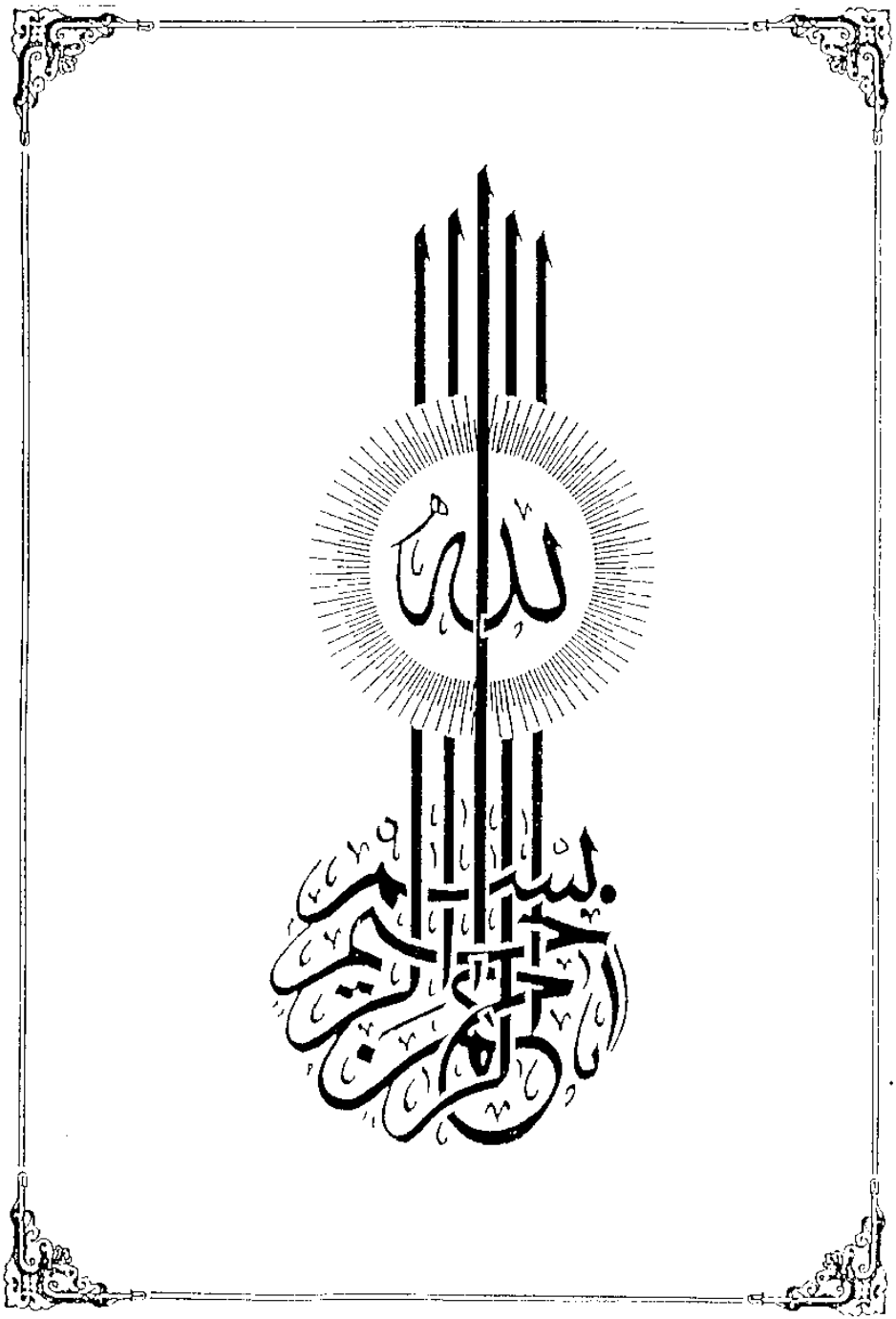
To
My Parents



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Introduction and aim of the work:

Introduction:

From the earliest days of surgery, there was concern about the amount of time required and the extent of tissue trauma associated with certain procedures, particularly those involving the abdominal organs. Indeed, it was only in the late nineteenth century that surgeons began confidently to undertake closure of wounds in the bowel and to perform intestinal anastomoses.

Restoration of function, effective haemostasis, reduction of tissue trauma and the prevention of postoperative sepsis and other complications were primary goals.

The beginning of the twentieth century showed a great advancement in using the stapling techniques in gastro-intestinal surgery.

The early development of mechanical stapling devices was demonstrated by a Hungarian surgeon, Professor *Humer Hültl.* Another major milestone occured in Germany by Dr. *H. Friedrich.* During 1940s, the Russians became the leaders in the field of surgical stapling. Then American manufacturers developed staplers which became simpler, lighter and more reliable.

The use of stapling devices specially in esophageal and low rectal surgery has been shown to produce results superior to those of traditional anastomotic methods.

(Hiller & Vernick, 1986)

Aim of the work:

This essay aims at giving a clear image for surgical societies in Egypt, about the benefits and advantages of using this developed technique in gastro-intestinal surgery by using staplers, showing at the same time the pitfalls and the complications which may occur in using this device, which has not yet been popular in our country.

Historical Review and Evaluation of stapling

Historical review and evaluation of stapling

Although numerous devices for closing abdominal wounds or joining organs were developed during the 1800's, it was not until 1908 that the first mechanical device using staples was demonstrated by a Hungarian surgeon, Professor *Humer Hültl.*

(Hiller and Vernick, 1986)

Together with the engineer and manufacturer *Victor Fischer,* he became interested in improving operative efficiency and in establishing a relationship between surgeon and engineer/ manufacturer in the design and production of new, mechanically sophisticated surgical instrument.

(Steichen and Ravitch, 1990)

This device - designed for use in distal gastrectomy - placed two double rows of fine steel wire staples so that the stomach or duodenum could be transected, leaving a double row of staples on both sides of the transection.

(Hiller and Vernicks, 1986).

Hültl used fine stainless steel staples comparable to the fine tantalum and stainless steel staples of the Russian instruments and stainless steel and titanium staples of the American instruments.

(Steichen and Ravitch, 1990)

The Instrument was widely acclaimed even though it was heavy and the assembly of its many parts was difficult and time -

consuming. The design incorporated three principles that are still used in modern internal stapling devices - B Shaped Configuration of closed staples; placement of staples in double staggered rows; and use of fine wire as the staple material.

(Hiller and Vernick, 1986).

The simpler, more popular instrument of ***Aladar Von Petz*** **(1924)**, then of Budapest and later of Berlin, and of ***Friedrich of Ulm*** **(1934)**, and the lesser known instruments of ***Stefan Sander*** **(1936)**, also a Hungarian Surgeon, and of ***Tomoda*****(1937)** of the Kyushu University in Japan, as well as later Japanese authors such as ***Nakayama and Uchiyama,*** all responded to the same concern of diminishing or eliminating contamination from the open bowel lumina.

In addition, these authors were interested in making the reconstructive phase of a given operation more efficient and in introducing mechanical Concepts to the simple act of sewing. All of these instruments were characterized by their use of a coarser, broader staple placed in a single Indian file. These staple rows, as well as the fine staples to which the Russian authors returned, were never relied upon as permanent suture lines and were always reinforced manually.

Stefan Sander, in order to avoid the double row of Hültl's instrument and yet accomplish a reliable staple line, devised an instrument that delivered staples placed obliquely within a single row. He and Friedrich were responsible for introducing other

important innovations such as a variable tissue and staple compression.

Friedrich's very ingenious instrument was also distinguished by the availability of interchangeable cartridges making the repeated use of stapling Possible within a single operation.

The instruments by Sander and Friedrich were the first ones to allow for simultaneous placement of all staples, a feature used in the Russian as well as American instruments whenever appropriate, such as in the linear closing and circular anastomosing intstruments.

At other times the sequential placement of staples as first developed by Hültl appeared to be better suited to the task, such as in the linear anastomosing instruments of the Russian and American authors.

(Steichen and Ravitch, 1990).

Russian Contributions:-

The intense efforts of the **scientific research institute for Expeimental Surgical Apparatus and Instruments in Moscow** covered a wide spectrum of Problems related to stapling.

(Steichen and Ravitch, 1984).

During the 1940s, the ex-called USSR began the first systematic program to develop stapling instruments with the establishment of the scientific Institute fo Experimental Surgical Apparatus and instrument in Moscow. As a result, the Russians subsequently became the leaders in the field of surgical stapling.

Their first instrument, designed for vascular surgey, was introduced in **(1951)**. Many other devices were developed, each intended for a specific stapling application (e.g. bronchus, gastrointestinal tract.) and utilizing a specific staple form, size, and pattern. During a pocedure application, the surgeon selected the appropriate type of instrument for each applicatoin.

In general, the Russian staples were complicated; many had to be loaded by hand and assembled before each use. some later models used preloaded cartridges.

(Hiller and Vernick, 1986).

The United States:-

The first stapler was introduced in the united states in 1967. The design of this reusable instrument was licensed from a Russian patent, as were many of the other early devices.

American manufactures eventually developed staplers that were simple, lighter and more reliable, and took leadership in the field.

One major improvement was the disposable staple cartridge, available preloaded with staples of different sizes and patterns. The surgeon could obtain the optimal Configuration for a pocedure by simply inserting the appropriate reloading unit.

In **(1918)**, *Ethicon,* INC. introduced the first preassembled disposable device - the Poximate disposable skin stapler. Other types of disposable instruments soon followed.

Most recently, "single - patient - use - reloadable stapler" have appeared. These instruments provide the convenience and potential cost saving of the preloaded, disposable types. In

addition, the capability applications during a case results in a lower average cost per firing.

(Hiller and Vernick, 1986)

Table "1" Original and Evolving Goals of Surgical Stapling

Hültl (1908), A. Von Petz (1921), H. Friedich (1934)

* Reduction/elimination of contamination
* Improvement of operative efficiency
* Introduction of bioengineering Concepts

Contributions of Soviet Surgeons Since (1950)

* Standard, safe, reproducible techniques
* Optimal results with basic sugical skills
* Improvement and creation of instruments and concepts
* Extending stapling to Bronchopulmonary surgery

American Contributions Since (1958)

* Improvement of intraoperative handling and versatility
* New instuments inspired by advancing concepts
* Reduction of tissue trauma and contamination
* Preservation of blood vessels

(Source: Sleisher and Ravitch, 1990).

Traditional Ways in Resection & Anastomosis of the Bowel