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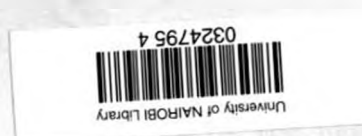
INGUINAL HERNIA AND HERNIA REPAIR IN ADULTS: THE DISEASE AS SEEN
AT KENYATTA NATIONAL HOSPITAL OVER A FIVE YEAR PERIOD.

JANUARY 1980 - DECEMBER 1984

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A THESIS SUBMITTED IN PART FULFILMENT FOR THE DEGREE OF MASTER
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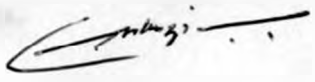
DECLARATION

STATEMENTS

THIS THESIS IS MY ORIGINAL WORK AND HAS NOT BEEN PRESENTED FOR A
DEGREE IN ANY OTHER UNIVERSITY.

I hereby declare that this dissertation and all the material
contained therein are my original work and have not been
presented for any other degree or diploma in any other
university.

I hereby declare that I am the Director, Kenyatta National Hospital
and I hereby declare that I have read and approved the
contents of this dissertation.



SIGNED -----

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THIS THESIS IS DEDICATED TO THE LATE MR. EMMANUEL E.A. OJARA,
M.MED (Surgery) AND HAS BEEN SUBMITTED FOR EXAMINATION WITH THE
APPROVAL OF THE DEPARTMENT OF SURGERY, UNIVERSITY OF NAIROBI.

I hereby declare that I would like to thank Mrs. Mary Ojara for
her assistance in writing this thesis.



SIGNED -----

PROF. J.S. OLIECH, F.R.C.S.
ON BEHALF OF THE DEPARTMENT OF
SURGERY, UNIVERSITY OF NAIROBI

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SUMMARY

This is a retrospective study of all adult patients with inguinal hernia who were admitted at the Kenyatta National Hospital, Nairobi, over a five year period, between January, 1980 and December, 1984.

A total of 302 adult patients were included in this study. The relative sex incidence showed that the number of cases of inguinal hernia in this study were predominantly males, 296 males were seen compared with 6 females, giving a male to female ratio of 49:1. Majority of the patients were between the second and fifth decade of life.

Indirect inguinal hernia was the most common of all form of hernias studied. There were 93.4% cases of indirect inguinal hernia and 6.6% cases of direct inguinal hernia. Most of the hernias occurred on the right side (65.9%) than on the left side (24.1%). 9.3% occurred as bilateral inguinal herna. 80.1% of the patients presented with reducible hernia, 0.7% as irreducible hernia, 9.3% as obstructed and 9.9% as strangulated, of all cases of strangulated inguinal hernia only one was direct.

Some patients presented with pin-pointing predisposing causes of inguinal hernia. 16 male patients presented with history of straining at micturation and were found to have enlarged prostate.

5 patients had history of chronic cough out of which 4 were proven cases of pulmonary tuberculosis which had been adequately treated. 2 patients had history of straining at stool.

The patients were admitted to hospital as either cases of elective hernia repair or emergency surgery. 92.7% of the cases seen underwent surgery. 7.3% were treated conservatively and had been booked for surgery after the period of this study. 74.8% of the patients had elective hernia repair and 17.9% had emergency surgery.

The type of hernia repair recorded was simply described as Bassini repair. The type of suture material used was not indicated in operation notes. The patients with bilateral hernias had both hernias repaired at the same time. 77.8% of the patients who underwent emergency surgery had viable gut and 22.2% had gangrenous gut which resulted in resection and anastomosis.

Only 4 patients had surgery under local anaesthesia. The rest of the patients had general anaesthesia.

Surgical complications included scrotal oedema and hematoma in 1.0% and wound infection in another 2.0%. 1 patient had testicular atrophy.

The average hospital stay was 3.3 days. Post operative follow up in surgical outpatient clinic was on the average twice. Only 2 of the patients who had inguinal hernia repair had recurrence.

INTRODUCTION

Hernia is usually defined as the protrusion of a viscus from the cavity in which it is normally contained⁴². It may be said with accuracy that inguinal hernia is among the oldest of man's maladies and one of the first to be recognised so inescapable its appearance and so tell-tale the discomfort¹.

Hernia is a very prevalent disease. It affects both sexes all races and all ages of human beings. Many attempts have been made to estimate the incidence of hernia in the general population and relative frequency and various types⁴⁰. The incidence of inguinal hernia is difficult to estimate but it is the commonest type of hernia in adults and is a major cause of morbidity, disability and loss of earnings⁸.

Diagnosis of inguinal hernia is a clinical one. Most patients make their own diagnosis⁸. The presence in the line of the groin of a lump which varies in size, expands on straining or coughing and which may progress down into the scrotum in male is sufficient for confident diagnosis⁴³.

The treatment of inguinal hernia is operative repair. This is in form of either elective or emergency surgery. Non-operative or mechanical palliative methods have no place in its elective management. Hernia must be recognised as a mechanical defect

which only adequate surgical repair can possibly correct. The optimum time for such therapy is immediately after the hernia has been discovered⁴³.

Sepsis is a great hazard of inguinal hernia repair and may be avoided by a careful repair technique, avoidance of hematoma formation, neat ligation and careful suturing to avoid 'dead space'. The wound infection rate of 2.84% in elective hernia repair was reported by Cruse¹³ and Bowen et al.⁷.

The mortality of surgery for strangulated hernia is 8-13% and rises to above 20% when treatment includes bowel resection¹⁹.

No topic excites so much anxiety or guilt among surgeons as recurrence rates after elective inguinal hernia repair⁸. Although some individual series show a recurrence rate of under 1% the general rate of recurrence is nearer 10%¹¹. The recurrence takes place within a year in most cases.

Historic Review 1, 38, 42.

Hernia is an old disease, as old, presumably as man himself. The earliest recorded mention of hernia is found in Egyptian Ebers papyrus which dates back to about 1500 BC, but the information contained therein according to its translator, B. Ebbell, is much older.

The earliest detailed account is found in writing of Celcius in the first century AD. The word hernia is derived from Greek "hernios" meaning a branch or offshoot and is merely descriptive of the swelling that the lesion produces. Celcius advised operation in painful but uncomplicated hernias and truss where surgery was not recommended. Pauleus Aegineta in seventh century introduced cautery, where the skin, subcutaneous tissue and fascia were burned down to and including the pubic bone. The wound was then allowed to heal by granulation in hope that the scar thus formed would be of sufficient strength to prevent further herniation.

Other operations were described by Geraldus or Metz and practised by Ambrose Pare. A noteworthy contribution was made by Pierre Franco in the 16th century. Casper Stromayr, a German surgeon in his book of 1559 sharply differentiated direct inguinal hernia from indirect inguinal hernia.

Anatomy of inguinal region was thoroughly studied by men whose names are still associated with structures in that area: Vesalin, Scarpa, Cooper, Gubernat and Hesselbach.

Pioneers of herniorrhaphy were Czerny in Germany, Lucas-Championiere in France, and Macewen and Wood in Great Britain. The modern era in the surgical treatment of inguinal hernia began with work of Marcy of Boston U.S.A. He was the first to emphasise the obliquity of the inguinal canal as basis of integrity. His

first herniorrhaphy was performed in 1869 and was repeated two year later.

Endoardo Bassini first reported his operation in 1887 and around a series of 242 cases⁴⁴. The following year he reported a series of 102 cases successfully treated by his technique. He thought that a solution to the problem might be in a physiological contraction of the inguinal canal for the passage of the cord, so that it again possessed an internal and external opening, or anterior and posterior wall. Little of fundamental significance has been added in the 100 years since Bassini's method was described.

MATERIALS AND METHODS

This is a retrospective study covering the period 1980 to 1984 inclusive. The case histories of all patients above the age of 12 years who were seen at the Kenyatta National Hospital, Kenya and diagnosed as having inguinal hernia were reviewed. The histories were obtained from the files in the Records Department. All the files coded as 550.9 according to the international classification for procedures in medicine (W.H.O. 29:35) were used. From this code the information obtained was entered in a standard form shown below:

Reducible hernia means that the hernia either reduces itself when the patient lies down or can be reduced by the patient and

History of Pregnancy -

Parity -

PATHOLOGY

- Site

Right-----

Left -----

Bilateral -----

- Duration from onset

- Complaints

Mass -----

Pain -----

- Reducible

Irreducible

Obstructed

Strangulated.

MANAGEMENT

- Observation -

- Emergency Operation -

- Elective Operation -

Type of Repair -

Material used - **Silk** -

Nylon -

Others - **Specify**

Outcome of surgery

Recurrence

Duration of onset -

Possible cause -

Year	1955	1956	1957
1955			
1956			
1957			
1958			
1959			
1960			
1961			
1962			
1963			
1964			
1965			

RESULTS

A total of 302 adult patients with inguinal hernia were admitted at Kenyatta National Hospital in a 5 year period between January 1980 and December 1984. The number of patients admitted has been gradually increasing from 47 in 1980 to 94 in 1984 with a decrease in 1982 (32 patients). This does not necessarily reflect an increase in the pathology but may merely mean an increase in the awareness in the part of the patient to seek medical attention.

TABLE I - The number of Adult male and female cases of Inguinal hernia seen at Kenyatta National Hospital for the period 1980-1984.

YEAR	MALE	FEMALE	TOTAL
1980	46	1	47
1981	49	2	51
1982	32	1	33
1983	73	0	73
1984	92	2	94
TOTAL	296	6	302

SEX DISTRIBUTION

The number of cases of Inguinal hernia in this study were predominantly male. 296 males (98%) compared to 6 (2%) females were included in this study giving a male to female ratio of 49:1.

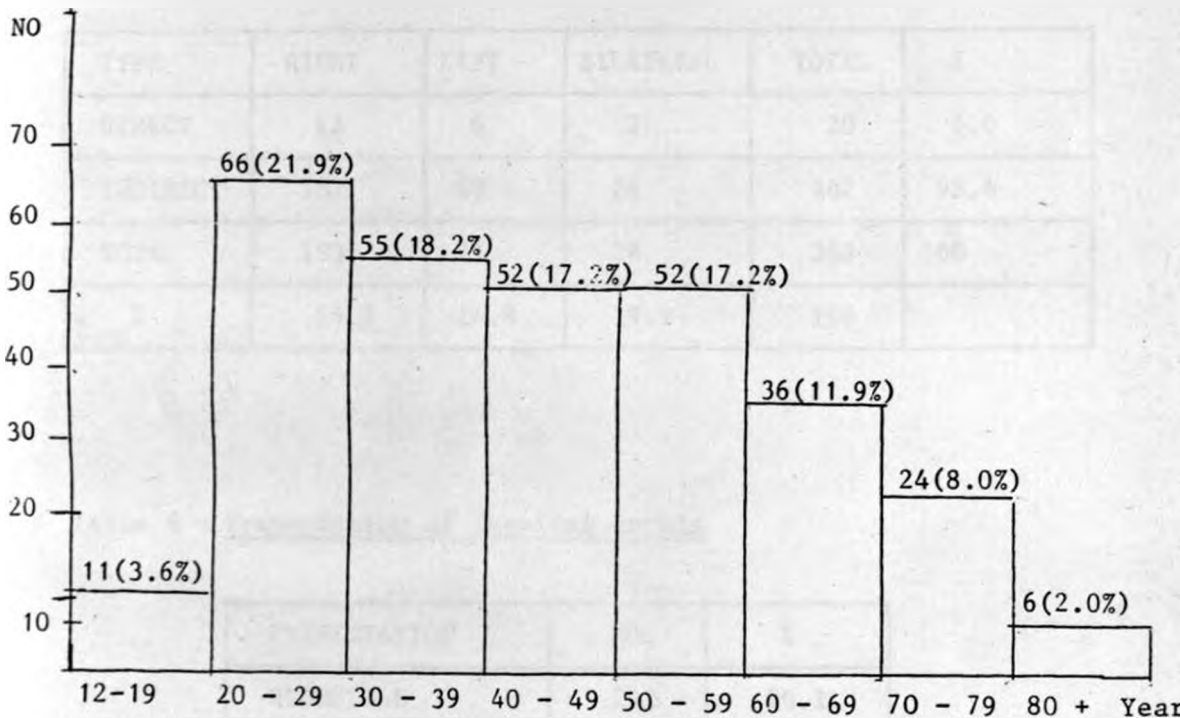
Table 2 - Sex distribution of the 302 cases of inguinal Hernia.

SEX	NO	%
MALE	296	98
FEMALE	6	2
TOTAL	302	100

AGE DISTRIBUTION

Majority of the patients were between the second and fifth decades.

Figure 1. Histogram Inguinal Hernia Patients By Age.



PATHOLOGY

Indirect inguinal hernia was the most common of all forms of hernia studied. There were 282 (93.4%) cases of indirect inguinal hernia compared to 20 (6.6%) cases of direct inguinal hernia. There were 199 (65.9%) cases of right inguinal hernia and 75 (24.8%) cases of left inguinal hernia. The number of cases seen as bilateral inguinal hernia was 28 (9.3%). 242 (80.1%) of the patients presented with reducible hernia, 2 (0.7%) as irreducible hernia, 28 (9.3%) as obstructed and 30 (9.9%) as strangulation. Of all cases of strangulated inguinal hernia only one was direct inguinal hernia.

Table 3 - Type of Inguinal Hernia seen

TYPE	RIGHT	LEFT	BILATERAL	TOTAL	%
DIRECT	12	6	2	20	6.6
INDIRECT	187	69	26	282	93.4
TOTAL	199	75	28	302	100
%	65.9	24.8	9.9	100	

Table 4 - Presentation of Inguinal Hernia

PRESENTATION	NO.	%
REDUCIBLE	242	80.1
IRREDUCIBLE	2	0.7
OBSTRUCTED	28	9.3
STRANGULATED	30	9.9
TOTAL	302	100

Predisposing causes

16 male patients presented with history of straining at micturation. They were all diagnosed as having benign prostatic hypertrophy. 14 of them had had previous prosectomy and 2 of them had prostatectomy and hernia repair at the same time of surgery.

5 (1.7%) patients had history of chronic cough, out of which 4 (1.3%) were proven cases of pulmonary tuberculosis which had been adequately treated.

2 (0.7%) patients had history of straining at stool and presented with haemorrhoids.

The rest of the patients had no recorded predisposing causes.

MANAGEMENT

The patients were admitted to hospital as cases of either elective hernia repair or emergency surgery. 280 (92.7%) of the cases seen underwent surgery. The remaining 22 (7.3%) were treated conservatively and had been booked for surgery after the period of this study.

226 (74.8%) of the patients who had surgery had elective hernia repair and 54 (17.9%) had emergency surgery.

The type of hernia repair was mainly Bassin's herniorrhaphy. The type of sutures materials used was not indicated in the operation notes.

The patients with bilateral hernia had both hernias repaired at the same time of surgery.

Table 5 - Type of Treatment

TYPE	NO.	%
OBSERVATION	22	7.3
ELECTIVE SURGERY	54	17.9
EMERGENCY SURGERY	226	74.8
TOTAL	302	100

42 (77.8%) patients out of the 54 patients who had undergone emergency surgery had viable gut and the remaining 12 (22.2%) had gangrenous gut which resulted in resection and anastomosis..

Table 6 - Emergency Inguinal Hernia Surgery

	NO.	%
VIALBE GUT	42	77.8
GANGRENOUS GUT	12	22.2
TOTAL	54	100.0

ANAESTHESIA

Only 4 (1.4%) patients underwent surgery under local anaesthesia 2 of whom had essential hypertension and not fit for general anaesthesia. One (0.4%) patients had a regional spinal block (epidural). Those who had local anaesthesia were given intravenous pethidine and diazepam and a local infiltration of 2% procaine hydrochloride. The rest of the patients (98.2%) had general anaesthesia.

COMPLICATIONS

3 (1.0%) patients had scrotal oedema and hematoma and 3 (1.0%) other patients had wound infection. One of the patients with wound infection had a pus culture which grew Gram negative cocci and E. Coli which was sensitive to tetracycline and gentamicin. The patients were successfully treated with tetracycline.

One (0.4%) patients had injury to the bladder which was repaired. One (0.4%) other patients had testicular atrophy.

Table 7 - Complication of Inguinal hernia repair

COMPLICATION	NO.	%
SCROTAL OEDEMA AND HEMATOMA	3*	1.0
WOUND INFECTION	3	1.0
BLADDER INJURY	1	0.4
TESTICULAR ATROPHY	1	0.4
TOTAL	8	2.8

HOSPITAL STAY

The average hospital stay was 3.3 days. 2 (0.7%) of the patients who stayed in hospital for one day had been admitted with obstructed inguinal hernia which reduced spontaneously. Another 3 (1.0%) had been admitted as day cases and their operations cancelled for various reasons and had been booked for operation at a later date. All the 8 (2.6%) patients who stayed in hospital for more than 12 days had strangulated hernia with gut resection. All the 3 (1.0%) patients who had wound infection stayed for more than 7 days. Some surgeons preferred to discharge the patients who had no complication within 2 days while others had their patients stay in hospital longer.

Table 8 - Hospital Stay

<u>No. of Days</u>	<u>No. of Patients</u>
1	5
2	99
3	60
4	52
5	32
6	18
7	17
8	2
9	1
10	7
11	1
12	2
13	1
14	5

Average Hospital stay - 3.3 Days

POST OPERATIVE FOLLOW UP

Most of the patients were only seen twice in the surgical outpatient clinic for post operative follow up.

RECURRENCE

Only 2(0.7%) of the patients who had inguinal hernia repair had recurrence. This may not be a true reflection of the situation because of the short duration of follow up, lack of complete records and defaulters.

DISCUSSION

INCIDENCE

Hernia is a very prevalent disease it affects both sexes, all races and all ages of human beings. Many attempts have been made to estimate the incidence of hernia in the general population and relative frequency and various types.

The incidence of inguinal hernia is difficult to estimate but is commonest type of hernia in adults and is a major cause of morbidity, disability and loss of earnings. It is very difficult to assess the frequency of hernia in Africa¹³. A low operation rate may indicate chronic shortage of beds and doctors' time, while a high rate may mean enthusiasm and surgical competence on part of the medical practitioner. However, it can be assumed that operation for strangulation bears a relationship to the overall frequency. In tropical Africa, strangulated inguinal hernia is the commonest cause of intestinal obstruction accounting for 65-75% of strangulated external hernia⁷.

Where surgeons are in short supply the number of hernia must go on accumulating from year to year and this may explain the fact that 9% of an unselected group of young Africans seeking employment in Zimbabwe were found to have external hernias¹⁶. A comparable figure for the United Kingdom is 2%. 6% of male recruits (i.e. young men) during the World War II were found to have inguinal hernia.

Inguinal hernia was present in 12% of railroad workers in the USA⁸.

The relative incidence between direct and indirect inguinal hernia was quoted by Watson indicating that the usual proportion of indirect to direct is about five or seven to one³⁹. A study of 632 inguinal hernia repairs in Ife, Nigeria demonstrated that indirect hernia was more common than the direct type with a ratio of three to one (3:1)³². It is true that Erdman found 313 cases of direct hernia in a series of 978 inguinal hernias but Coley makes the following observations on this finding, "Erdman's proportion of direct to indirect hernias, nearly 33%, is very much higher, we believe, than shown in any other statistics". Coley himself found one direct to fourteen indirect hernias in 1383 cases of inguinal hernia in adults⁵. In some regions of East Africa direct hernia was found to be more than indirect hernia. In Jinja Hospital, Uganda, among the Busoga people direct inguinal hernia was found to be more than the indirect type¹⁴. This study at Kenyatta National Hospital showed that indirect inguinal hernia was most common forming 93.4% of the cases studied. This gave a ratio indirect to direct hernia as 13:1, which compares well with many studies elsewhere.

The relative incidence for male to female was quoted by Connel in 1930 as reported in a series of 202 cases of inguinal hernia in Africans, which did not include a single case in a female. He was led to believe that African women must be

practically immuned to the malady. However, Asley showed in a total of 649 inguinal hernias a proportion of one female to every 7.65 males⁵. This figure compares well with generally accepted figures for other races. Watson gave the proportion of one female to nine males (9:1)³⁹.

Eckhart reported the ratio of males to females suffering from inguinal hernia as seven to one (7:1)³⁹ Brendan reported a male to female ratio of 12:1 among the USA population⁸. The number of cases of inguinal hernias in this study were predominantly male giving a ratio of 49.1.

ANATOMY

From dissections of the inguinal region of normal human cadavers and of specimens manifesting indirect inguinal hernias the fundamental anatomy of the parietal and funicular layers is described⁴². Typically, each layer is trilaminar in character. The external oblique stratum is composed of aponeurostic fibres invested on each surface by a fascial layer. The internal oblique layer is formed mainly of muscle fibres likewise invested by fascia. In similar fashion the transversus layer is formed but in its inferomedial portion the musculoaponeurotic part is usually deficient and the investing fascia fused one to another complete the layer^{1, 30}.

In its course through the parietal wall, the spermatic cord carries about it, in funicular manner, strata which are prolonged from the abdominal wall. On its external surface the transverse layer becomes tubular about the spermatic cord in the plane of the parietal wall, the tube resembling a curved pipe emerging from a flat surface²². In a course obliquely medialward and downward, the fascial tube lies against the inferomedial part of the transversus layer, the so called surgical floor of the inguinal canal. A transection in this region would reveal an apparent reduplication of transversus layer where the posterior wall of the internal spermatic tube lies against the portion of transversus layer medial to the abdominal inguinal ring. The internal oblique stratum does not invest the cord tightly at its proximal end, but surrounds the cord as a broad infundibuliform investment. There is no reduplication at the "intermediate inguinal ring" and therefore the mouth of the funnel is wide. This intermediate ring is usually more than twice the size of the abdominal inguinal ring. After acquiring its cremasteric coat, somewhat below the level of pubic tubercle and inguinal ligament, the cord passes forward beyond the plane of the external oblique layer, carrying with it the external spermatic fascia in tubular form²⁶.

Thus, it may be said that almost the entire oblique portion of the spermatic cord in the inguinal canal lies behind the internal oblique layer, between it and the reduplication portion of the transversus layer. In this position, the cord is

ensheathed by the internal spermatic fascia. In cases of indirect hernia, however, the obliquity of the inguinal ring is enlarged medially to accommodate the hernial sac. In severe cases, the external and internal rings may be superimposed upon each other; migration of the abdominal ring is the result of simple pressure and gravitation. These mechanical factors operate to draw the whole sac downward and medialward, in fascial tissue, to a point where further movement is hindered by the presence of the rectus muscle.

Each derived stratum about the spermatic cord reflects, in general, the character of the source layer in the inguinal wall. The contribution from the external oblique is entirely fascial, it consists of the conjoined fascias which invest the external oblique aponeurosis. Fused into a single layer at the subcutaneous inguinal ring, it forms the external spermatic fascia. In normal and in hernial specimens, this layer is readily dissected from the deep layer of superficial fascia of the scrotum, and from the cremasteric prolongation of the internal oblique.

The layer derived from the internal oblique (cremasteric layer) is carried downward not from the definite margins of an aponeurotic fault or cleft, but rather from a local area of musculoaponeurotic stratum. Although scattered muscle fascicles are discoverable in the specimens illustrated, aponeurotic bands, if present at all are seemingly too attenuated to be evident.

The layer, like that derived from the external oblique is predominantly fascial.

The peritoneal sac first passes through the wall in an oblique or indirect course, later in a direct course. In the latter instance, it would be in contact medially and caudally with a displaced inferior epigastric artery: the artery, with accompanying veins, is pressed into a position behind the rectus muscle, which then constitutes the medial boundaries of the hernial orifice, the triangular space of Hesselbach being obliterated. The inferior epigastric vessels, in being displaced, pass from medial to inferior aspect of the sac. In company with these vessels, situated on the floor of the abdominal ostium, are also placed the iliac artery and vein, the ductus deferens and internal spermatic vessels and iliac lymph glands. The relations of an enlarged hernia sac are, therefore, more numerous and of greater importance, than conventional descriptions and figures would lead one to suppose.

In case of direct hernia the hernia mass is bulbous. The mass consist chiefly of fatty tissue which covers a thin tubular prolongation of the inguinal peritoneum. The site of herniation is the triangle of Hesselbach³³.

The covering derived from the transversus abdominis is thin and wholly fascial; it contains neither aponeurotic bands nor muscle fascicles - that is to say, one of those stronger

supporting elements which, traditionally, are thought to make up part of the aponeurotic inguinal flax (conjoined tendon). This fascial covering represents a downward continuation of the investing fascias of the transversus muscle, fused to form a single lamina where muscle fibres terminate, and locally displaced to cover the pedunculate fatty mass. Its thin character is to be wholly expected, since, in the great majority of cases, the inferior portion of the transversus abdominis is only a moderately strong aponeurotic plate which the transversus muscle contributes medially to the sheath of the rectus muscle.

Most direct inguinal hernias rest upon the pubic tubercle and the adjacent part of the superior pubic ramus. The neighbouring vascular structures are the following: the epigastric vessels (laterally situated); the external iliac vessels (inferiormedially). Enlargement of the hernial sac with resultant spread toward the abdominal ring, would bring the hernia into relation with genitofemoral nerve, spermatic vessels, ductus deferens and obturator artery.

CONGENITAL FACTORS IN THE GENESIS OF GROIN HERNIA

Of the factors associated with herniation in the groin, congenital ones probably are the most important. Both the anatomical and the clinical laboratory have provided supportive data for this concept³³.

The inguinal area is the site of indirect inguinal hernias occurring through an unobliterated processus vaginalis and direct hernias through weak area (Hesselbach's triangle) between the pubic ramus and the musculofascial component of the lower abdominal wall.

It is estimated that 25% of adult individuals have a patent processus, and it is a percentage of these who develop inguinal hernia. The peak incidence of hernia is during infancy, when about 50% of males have patent vaginal processus. Therefore the common indirect inguinal hernia appears to have an anatomical basis as the predominant factor in its development. Other possible causes that cannot be dismissed are the role of local trauma or degenerative changes related to chronically increased abdominal pressure, defective replacement of collagen with fat as aging occurs etc.

The direct inguinal hernia occurs between the pubic ramus and the arching border of the transversus muscle, medial to the deep inferior epigastric vessels. The individual patient who possesses a transversus with a high arching lower border is at risk for the development of this hernia. Anson et al.³ found this anatomical variant in 8% of 1,200 dissections reported on in early 1960s.

The emphasis on congenital factors is not meant to imply

that sudden stresses such as abdominal trauma, industrial accidents etc, or more chronic processes (e.g. multiparity) may not play a role in the sudden "appearance" of hernia in a previous asymptomatic patient. These factors are thought to be provocateurs only in the presence of the weak or attenuated transversus-transversalis layer.

If, on the other hand, the weakness is only relative, considerable and often long continued and frequently repeated surges of pressure, such as those which accompany lifting, straining coughing sneezing, retching, micturation or defecation, may be required to complete the rupture in continuity of the abdominal wall. Occupational factors are therefore involved and it is generally believed that vocations requiring heavy lifting and severe straining are more frequently associated with the development of hernia.

PATHOLOGY

A hernia consists of three parts, the parietal defect, the sac and the contents. The sac is an out-pouching of the peritoneum into which the herniated viscera are extruded. The presence of a sac is not essential to fulfill the definition of hernia. Most peritoneal sacs are of congenital origin and represent persistent of embryological structures. In indirect inguinal hernia the sac in males represent failure of obliteration

of the funicular process; in female they are remnants of the canal of Nuck. It is conceded, however, that once contents enter such a sac further increase in size may occur as a result of distention by the herniated structures.

Adhesion of content to the lining of the sac and adherence of one bowel loop to another within the sac are commonly encountered. The presence of fibrous adhesions between the sac wall and its contents is a proof that a hernia has been present for a considerable period of time.

Interference with blood supply to the viscera contained in a hernia not infrequently results from constriction at hernial ring. The circulatory impairment may produce tissue changes ranging from mild, passive hyperemia and oedema to complete ischaemic necrosis. The circulatory impairment may become aggravated by thrombosis of the mesenteric vessels supplying the strangulated intestine, and torsion of a bowel loop within a hernia sac may complete a partial ischaemia. Venous occlusion may lead to haemorrhage and oedema of the bowel which may progress to haemorrhagic infarction. Perforation of the bowel or migration of pathogenic bacteria through a haemorrhagically infiltrated intestine wall may give rise to peritonitis. The exudate in the sac may range from a colourless, serous fluid to a haemorrhagic and even a putrid, purulent liquid.

CLINICAL MANIFESTATION

The clinical signs and symptoms of hernia are essentially those of swelling with or without associated pain. The swelling is characteristically soft and fluctuant in character. In most instances, the mass appears with coughing or straining, and can be made to disappear by having the patient lie down, with perhaps the further aid of digital manipulation. A characteristic gurgling sensation is felt and heard when the intestine coils are returned to the abdomen. Straining or exertion increases the size of the mass, and an "expansile impulse" is induced by coughing. As a rule, there is very little tenderness in uncomplicated hernias.

If the hernia is incarcerated or irreducible the mass is apt to be firmer, fixed and less affected by changes in abdominal tension. When strangulated, the hernial swellings are tense, firm and extremely tender, and they cannot be dislodged without considerable pressure.

Pain is an extremely variable component in the symptom complex produced by hernia. Pain may be evoked from pressure upon the ring, by compression of the contents or by traction upon the viscera.

Intestinal obstruction, with characteristic phenomena of cramp-like pains, nausea and vomiting and constipation be produced by the compression, angulation or torsion of intestinal loops in the hernial sacs. This picture, too, may occur as part of the syndrome of strangulation. Under these circumstances, the process is more acute and stormy and culminate rapidly in the terminal stages of perforation, gangrene and peritonitis.

DIAGNOSIS

Diagnosis of Inguinal hernia is a clinical one. Laboratory and radiological investigation have only a supportive role. Most patients make their own diagnosis of an inguinal hernia.⁸ The presence, in the line of the groin, of a lump which varies in size expands on staining or cough and which may progress down into the scrotum is sufficient for a confident diagnosis.⁴³ Whether the inguinal hernia is direct or indirect cannot always be accurately decided on clinical examination.

It is important to identify the small narrow necked, indirect hernia because of the risk of strangulation. The physical diagnosis of a small inguinal hernia in an individual can be quite difficult. laparoscopy can greatly facilitate the diagnosis of occult inguinal hernia in patients with obscure groin and abdominal pains.²¹ In experience hands the procedure is safe and yields highly significant information. Hunt described four cases of patients who presented with groin pain from small inguinal hernia who were diagnosed by laparoscopy.

Radiological diagnosis with positive contrast media has been used in infants for several years.^{30,31,41} Herniography is useful examination in evaluation of adult with groin pain if obscure. Its use has been reported in adults.⁴ There is a need for a diagnostic method in those adults who have histories compatible with inguinal hernia but who have normal or inconclusive physical examination.¹⁵ The value of herniography in these cases has been claimed by Gullmo.¹⁸

The possibility of disclosing an inguinal hernia by pneumo-peritoneography has been described but has not been used routinely²⁵.

Clinical series and animal experiments have demonstrated that water-soluble iodine contrast medium is not harmful to the peritoneum^{28,36,37}.

The demonstration of a herniated bowel loop by barium examination of the small bowel and colon has been reported^{24,27}. This method is of limited value for the diagnosis of hernia, because even rather large peritoneal sacs do not always contain bowel, as was seen in several cases in series by Ekberg¹⁵.

The demonstration of a herniated part of the urinary bladder or ureters by urography has been reported, but this phenomenon is also unreliable³⁴.

Herniography may be less helpful in patients with incarceration, when the contents of the hernia obstructs the inner opening, thus preventing the contrast medium from flowing into the hernia¹⁴. The differentiation between femoral and indirect hernia can be difficult. Clinically obvious hernias in adults are no indication for herniography, which should be reserved for those patients with a history of groin pain in whom the physical examination is normal or inconclusive²³.

Differential Diagnosis

Reducible inguinal hernia rarely offer difficulties in diagnosis. The differential diagnosis include bulbous varix of the greater saphenous vein at the fossa ovalis. Scrotal hernias must be differentiated from all other conditions producing scrotal swelling. These include hydrocele, varicocele and enlargements of the testis. Hydrocele produce a smooth tense fluctuant mass which can be transilluminated and does not extend into the inguinal canal. In the female hernias must be differentiated from other labial swellings. These include cysts and abscess.

Femoral hernia is the third most common type of hernia. It accounts for about 20% of hernia in women and 5% in men. To differentiate between an inguinal and femoral hernia is sometimes difficult particularly in obese persons. This difficulty is increased by the fact that enlarging femoral hernias tend to turn upward as they emerge from the fossa ovalis and may come to overlies the inguinal ligament. However, palpation over the inguinal canal and the cord distal to the external ring usual serves to establish the presence or absence of an inguinal hernia. If the defect after reduction of a hernia is below the inguinal ligament, the hernia must be femoral.

TREATMENT

The treatment of inguinal hernia is operative repair. Non-operative or mechanical palliative methods have no place in its elective management. Hernia must be recognised as a mechanical defect which only adequate surgical repair can be possibly correct. The optimal time for such therapy is immediately after hernia has been discovered. The only contraindication to operation for inguinal hernia is impairment of the general health of sufficient severity to render such an operation unduly hazardous.⁴²

The principal nonoperative treatment for inguinal hernia is the time-honoured use of the truss. However retention of use of the truss has no place in the modern management, except in the very occasional situation mentioned above, where surgery is contraindicated because of current serious illness or major impairment of the general condition. The truss imparts a false security, which tends to encourage its wearer to postpone operation beyond the optimal time for surgical repair.

The surgical management of inguinal hernia is either elective herniorrhaphy or emergency operations for obstructed and strangulated hernia.

Modern surgery for inguinal hernia began with the Bassini Operation about 100 years ago. Innumerable modification and "improvements" have been advocated. Many are definitely less physiological than is the original Bassini method. The Bassini operation is probably still the most widely employed of all at the present date.

The main principles in operative management of inguinal hernia are as follows.⁸

- (1) The normal anatomy should be reconstituted as far as possible. The primary defect in either an indirect or direct hernia, is the transversalis fascia; this should therefore be repaired first.
- (2) Only tendinous/aponeurotic/fascial structures should be sutured together. Suturing red fleshy muscle to fascia will not contribute to permanent fibrous union.
- (3) The suture material must retain its strength long enough to maintain tissue apposition and allow sound union of tissues - a non-absorbable or very slowly absorbable suture material must, therefore, be employed (e.g. polypropylene).

Suture Material

At least 5 months of healing and remodelling of the aponeurosis is required before there is adequate strength in a hernia repair; the choice of suture material is, therefore, most important.

The repair suture must:⁸

- maintain its strength for 5 months.
- be inserted so that the tissue it 'bites' maintains its strength
- have secure knots
- be of an easily handled material
- have a low index of inflammatory response.

Polyglactin 910 and chromic catgut lose 60% of their strength within 20 days of insertion; silk loses 40% of its strength in 40 days, 80% in 80 days and causes inflammatory response; polyamide loses 20% of its strength in 50 days; polyesters retain their strength but, being woven, may harbour sepsis; stainless steel wire excites little tissue reaction, retains its strength but is difficult to handle; none of these materials can be recommended for hernia repair.

Polypropylene (prolene) retains its strength and has a low index of tissue response and is suitable material for hernia repair.

Anaesthesia

A local or general anaesthesia may be used. The advantages of local anaesthesia include cost and patient co-operation during surgery. It also accounts for short hospital stay. Advocates of local anaesthesia maintain that there is less risk of over-zealous surgical suturing distorting the anatomy. However long-term results of hernia repair show no difference in recurrence rate between those repaired under local general anaesthesia.⁸

For local anaesthesia 0.5% lignocaine, with 1:200,000 adrenaline may be used to a maximum of 100 mls for a 70kg man. An alternative anaesthetic is 0.25% bupivacaine hydrochloride with adrenaline 1:400,000; maximum dose is 2 mg/kg body weight. A skin weal is raised in the line of the incision and the ilio-inguinal and iliohypogastric nerves blocked lateral to the inguinal canal. The subcutaneous tissues, and the region of the deep ring and the emergent cord will need infiltration during operation.

A combination of short-acting regional anaesthesia (lidocaine epidural) given prior to the incision with long acting local anaesthesia (bupivacaine) injected while the wound is closed can be used³⁵. This provides appropriate operative anaesthesia and postoperative analgesia in out-patients.

In evaluating the merits of the type of anaesthesia used, mortality is the bottom line. At the Shouldice clinic, in 1973, 4132 herniorrhaphies for nonrecurrent inguinal hernias were performed under local anaesthesia without death⁶. In the same year there were 45 deaths in 16,444 elective herniorrhaphies for nonrecurrent inguinal hernias at all other hospitals in Ontario, Canada for an incidence of 2.5 per thousand.

The Bassini Method of Repair.

This classical operation was first described by Bassini in 1888. Innumerable modification and "improvements" have been advocated. Many are definitely less physiological than is the original Bassini method. The operation is probably still the most widely employed of all at the present date⁷. It consists essentially in strengthening the posterior wall of the inguinal canal in its lateral part, by stitching the lower border of the conjoined muscles and tendon down to the inguinal ligament behind the cord.

An incision is made through the skin and subcutaneous tissue parallel and 1 cm superior to the inguinal ligament. The aponeurosis

of the external oblique is divided in the direction of its fibres down to the inguinal ring. The sensory nerves lying just beneath the aponeurosis should be avoided. The hernia sac is separated from the cord structures by blunt dissection and by gauze stripping, ligated high, and the excess removed. The cord is then separated and the defect or weakness in the transversalis closed. The conjoined tendon is then sutured to the inguinal ligament beneath the cord, care being taken to secure satisfactory approximation at the pubis and at the internal ring. Four or five stitches are inserted at about 1 cm intervals between the muscle and tendon and the inguinal ligament. The stitches should be introduced at different depths into the inguinal ligament, in order that they may not cause splitting of the ligament along the line of sutures. In the placing of the stitches in the lateral part of the wound great care must be taken not to injure the external iliac vessels which lie immediately deep to the inguinal ligament. Stitches should not be tied too tightly.

The aponeurosis of the external oblique is repaired, either by simple suture, or preferably by overlapping over the cord, the subcutaneous tissues and the skin are then sutured.

Modifications of the Bassini repair.¹⁷

The criticism of the Bassini repair are based on the grounds that it is unphysiological. Most other methods of inguinal herniorrhaphy are based essentially upon the Bassini operation, but are designed to avoid such tension as may be inseparable from

this method. In general they serve to occlude the gap between the conjoined muscles and the inguinal ligament, by methods other than that of simply stitching these structures together.

These methods include:-

- Separation of conjoined muscle before suture
- Overlapping of the external oblique aponeurosis
- Relaxation incisions (Tanner slide)
- Anterior transplantation of the cord
- Repair by floss silk suture.
- Transplantation of fascia or skin
- Implantation of foreign material

Operation in female.

The inguinal canal is opened as in the male. The sac is separated from ligamentum teres (round ligament), and is amputated at its neck. If the separation is difficult the ligament may be removed along with the sac. If the canal is weak it is completely obliterated with sutures, the round ligament being disregarded.

Direct Inguinal Hernia.

The direct hernia sac may be either a broad based bulge behind and through the transversalis fascia or, less commonly, have a narrow neck. In the former repair, the sac should be pushed back behind the transversalis fascia, which is then repaired; in

the latter, extraperitoneal fat is removed, redundant peritoneum excised and the defect closed with a catgut transfixion suture. Care must be taken to avoid the bladder.

Bilateral Hernias

Patients with bilateral hernias should have staged, one side at a time, operations⁸. However, in most centres bilateral hernias are repaired at the same time of surgery. Brendan argues that if bilateral herniorrhaphy is done:-

- If sepsis occurs, it may be bilateral
- Simultaneous bilateral herniorrhaphy may cause oedema and swelling and bruising of the penis and scrotum.

He recommends an interval of 3-5 weeks between operations for bilateral hernias.

Management of Strangulated Hernia

The cause of death in strangulated hernias is largely due to inadequate resuscitation¹⁰. Strangulated hernia causes:-

- Fluid and Electrolyte loss
- Toxaemia
- Blood loss (particularly if a long loop is strangulated)
- Local complication of gangrene at the hernia site, e.g. faecal fistula¹³.

Successful management of strangulated hernias is based on early adequate resuscitation and immediate surgical release. If gangrene has developed resection and end to end anastomosis should be done through the hernia sac.

The bowel seldom if ever becomes gangrenous following strangulation under 24 hours and, for this reason, Bowsman considers an attempt at reduction is well worth a trial. Such an attempt however, should not, in his opinion, last more than eight hours, provided that the total time of strangulation, plus the postural treatment time, does not exceed 24 hours. He found that postural reduction had favorable outcome in over 70% of properly selected patients, two thirds of these being reduced in the first four hours. In practice, therefore, postural treatment should be given a trial for four hours. Making best use of this time replacing fluids and electrolytes.¹³

A hernia, once strangulated, demands repair before another episode occurs. Little is accomplished, therefore, even if reduction is achieved, beyond postponing the operation for a matter of days²⁹.

Complications

Of the complications peculiar to the operation for inguinal hernias, those most likely to be encountered include³²:-

- Scrotal oedema and haematoma
- Wound infection

- Local haematoma
- Bladder injury
- Testicular atrophy
- Fecal fistula

Sepsis is the great hazard and may be avoided by a careful repair technique avoidance of hematoma formation, neat ligaturing and careful suturing to avoid "dead space"⁸. The wound infection rate in this study of 1.0% is rather lower than that reported by Cruise¹² and Bowen et al.⁷ Oluwole, et al. reported a wound infection rate of 2.8% in patients who underwent elective surgery in Nigeria³².

Recurrence

No topic excites so much anxiety or guilt among surgeons as recurrence rates after inguinal hernia repair - repair of such a hernia is almost entirely dependent on surgical skill⁸. Although some individual series show a recurrence rate of under 1% the general rate of recurrence is nearer 10%¹¹. The recurrence takes place within a year in most cases. The largest series is reported by Glassow of Toronto, Canada where 17,000 cases of inguinal hernia repair had a recurrence of 0.8%.

The validity of any surgical procedure for the repair of inguinal hernias must be predicted upon a long-term follow up to

demonstrate the effectiveness of the recommended procedures²⁰. The assumption that there are few recurrences is fallacious for several reasons. First, unless the surgeon examines his patients periodically, he is only guessing as to the recurrence rate of his patients. Second, the presumption that the patient who does not return is not having trouble with a recurrence is wishful thinking, since many patients with a recurrence will seek "more skilled" help for second operation. Third, over a period of 10 to 20 years, many patients change their geographical area of residence and are lost to follow up. Fourth, a follow up of three to five years is totally inadequate to determine a recurrence rate.

CONCLUSION

This study confirms earlier reports in other studies that the incidence of inguinal hernia is higher in males than females, that indirect hernia is more common than direct type and that inguinal hernia is more frequent in the right groin than the left.

The number of patients seen and admitted at Kenyatta Hospital Hospital has been increasing gradually year by year. This however, does not mean an increase in the disease but may be a reflection of the awareness in the part of the patients to seek medical attention.

Most patients had hernia repair under general anaesthesia rather than regional or local anaesthesia. This was part of the preference of the anaesthetists. Local anaesthesia could have reduced the period of hospital stay.

The type of hernia repair was generally described as Bassini type of herniorrhaphy. The type of suture material used were in most cases not indicated.

The recurrence rate of 0.5% may not be a true reflection of the situation because of the short duration of follow up. The patient who does not return might seek "more skilled" help for second operation. Many patients change their geographical areas of residence and are lost to follow up.

REFERENCES

1. Anson, B.J. - Symposium on surgery of hernia.
The surgical clinics of North America Vol. 51, No. 6, 1971.
2. Anson, B.J.; Morgan, E.H.; McVay, C.B. - The anatomy of
the inguinal region based upon a study of 500 body halves.
Surg. Gynaecol. Obstet. III: 707 - 725, 1960
3. Anson, B.J.; Morgan, E.H.; McVay, C.B. - The anatomy of
the hernial regions. I - inguinal hernia.
Surg. Gynaecol. obstet, 89: 417 - 423, 1949.
4. Arner, O.; Fernstrom, I. - The value of pneumoperitoneum
in the diagnosis of hernias in the inguinal region.
Surgery, 67: 741-747, May, 1970.
5. Ashley, G.T. - Hernia in East Africa - an anatomical
analysis of 700 cases.
East African Medical Journal. 31: 315, 1954.
6. Berliner, S.D.; Burson, L.; Katz, P.; Wise, L. - An
anterior transversalis fascia repair for adult inguinal
hernias.
Am. J. Surg. 135: 633, 1978.
7. Bowen, J.R.; Thompson, W.R.; Dorman, B.A.; Soderber, C.H.;
Shatiinian, T.K. - Change in management of adult groin
hernia.
Am. J. Surg. 135: 564, 1978.

8. Brendan, H.D. - Inguinal Hernia.
Surgery, 2: 38-43, 1983.
9. Chiedozi, L.C.; Aboh, I.O.; Piserchia, N.E. - Mechanical bowel obstruction: Review of 316 cases in Benin city.
Am. J. Surg. 139: 393, 1980
10. Coles, G.J. - Strangulated hernia in Ibandan-a survey of 165 patients.
Trans. R. Soc. Trop. Med. Hyg. 58: 441, 1964
11. Clear, J.J. - Ten year statistical study of inguinal hernias.
Arch. Surg. 62: 70-78, 1951.
12. Cruse, P.J.E. - Incidence of wound infection in surgical services.
Surgical clinics of North America. 55: 1269 - 1275. 1975.
13. Davey, W.W. - Hernia.
Companion to surgery in Africa. 1st Edition, 1968.
14. Eckhart, P. - The incidence of strangulated hernia in Busoga.
East African Medical Journal . 41: 59, 1964.
15. Ekberg, O. - Inguinal herniography in adults:
Technique, Normal anatomy and diagnostic criteria for hernias.
Radiology, 138: 31-36, Jan., 1981.
16. Evans P.A.S. - Health surgey in 300 African males.
Central African Journal of Medicine. 7: 55, 1961.

17. Farquharson, E.L. - Farquharson's textbook of operative surgery. 6th Edition, 1977.
18. Gulmo, A. - On herniography.
proc. Swed. Soc. Radiology, 2: 19-20; 1973.
19. Hjaltason, E. - Incarcerated hernia.
Acta. Chir. Scand. 147: 263; 1981.
20. Havelson, K.; MacVay, C.B. - Inguinal and femoral hernioplasty.
Arch. Surg. Vol. 101 Aug., 1970.
21. Hunt, R.B.; Camer, S.J. - Laparoscopy in the diagnosis of occult inguinal hernia.
Am., J. Obstet. Gynaecol. Vol. 142, No. 7. 924-925.
April, 1982.
22. Leape, L.L. - herniographs - a commentary.
Surgery, 88: 361-362; March, 1978.
24. Liebeskind, A.G.; Elkim, M.; Goldnran, S.H. - Herniation of the bladder.
Radiology, 106: 257-262. Feb., 1973.
25. Lunderquist, A.; Rafsted, S. - Roentgenologic diagnosis of cryptorchism.
J. Urol. 98: 219-223. Aug., 1967.
26. MacVay, C.B. - The normal and pathological anatomy of the transverse abdominis muscle in the inguinal and femoral hernia.
Surgical clinics of North America. Vol. 51, 1971.

27. Martin, N.C.; Welch, T.P. - Obturator hernia.
Br. J. Surg. 61: 547-548; Jul. 1974.
28. McAlister, W.H.; Shackelford, G.D.; Kissane, J. - The histologic effect of some iodine-containing contrast media on the rat peritoneal cavity.
Radiology, 105: 581-582, Dec. 1922.
29. Munro, A.K. - Lancet 2: 839, 1951.
30. Oh. K.S.; Condon, V.R.; Dorst, J.P. - Roentneographic demonstration of femoral hernia.
Radiology, 127: 209-211. April, 1978
31. Oh. K.S.; Dorst, J.P.; White, J.J. - Positive contrast peritoneography and herniography.
radiology, 108: 647-654, Sept. 1973.
32. Oluwole, S.F.; Lawal, O.O. - Factors influencing the morbidity of strangulated inguinal hernia in Ife, Nigeria.
East African Medical Journal, Vol. 61. No. 11: 817; 1984.
33. Philip, E.D.; Llyod, M. - Surgical repair of groin and ventral hernia - The rational and strategy of management.
Advances in Surgery. Vol. 15: 93-121, 1981.
34. Pollack, H.M.; Popley, G.L.; Blumberg, M.L. - Hernias of of the ureter - an anatomic roentgenographic study.
Radiology, 117: 275-281. Nov. 1975.
35. Ryan, J.A.; Adye, B.A.; Jolly, P.C.; Mulroy, M.F. - Outpatient Inguinal Herniorrhaphy with both regional and local

anaesthesia.

36. Stern, W.Z.; Wilson, L. - Pelvis pneumography with simultaneous hysterosalpingography.
Radiology, 96; 87-92, Jul. 1970
37. Sternhil, I.V.; Schwatz, S. - Effect of hypaque on mouse peritoneum.
Radiology, 75 : 811-814, Nov. 1960.
38. Taylor, F.W. - The evolution of herniorrhaphy.
Am. J. Surg. 21: 131-138, 1933.
39. Watson, L.F. - Hernia,
3rd Edition, 1948.
40. Wekeley, C.P.G. - Treatment of certain types of external hernia.
Lancet, 1: 822-826, 1940.
41. White, J.J. - herniography - a prospective surgery.
83: 363-364. March, 1978.
42. Zimmerman, L.M. - Anatomy and Surgery of hernia.
2nd Edition, 1967.
43. Zimmerman, L.M. - Recent advances in surgery and inguinal hernia.
Surgical clinics in North America. 189-195, 1958.
44. Zimmerman, L.M.; Heller, R.E. - Edoardo bassini and his role in the development of hernial surgery. 1937.