

# OUTCOME OF STRANGULATED INGUINAL HERNIA

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## ABSTRACT:

**Objective:** To find out the presentation of strangulated inguinal hernia and look for features associated with morbidity and mortality.

**Methods:** Fifty consecutive patients presenting over one year period to emergency department with non-reducibility and pain in inguinal hernia were included in study. Detailed symptomatology and clinical findings at presentation were noted and patients were followed through their operative and postoperative period.

**Results:** Most of the patients (56%) were above fifty years of age. Ileum (74%), Omentum (36%) and large gut (14%) were encountered in strangulation in descending order of frequency. Fifty four percent of contents were non-viable. Duration of symptoms at presentation was the most important determinant factor regarding gut viability (14.48 hours [viable] vs. 59.04 [non-viable],  $p=0.004$ ) and mortality (26.26 hours [alive] vs. 101.29 [dead],  $p=0.0001$ ). Mortality was also noted to be higher in old age. Pre operative findings of absent bowel sounds, abdominal distension and redness of swelling were associated with non-viable contents ( $p<0.05$ ) and along with peritonitis, when present were associated with high mortality ( $p<0.05$ ). Overall mortality was 14%.

**Conclusion:** Operative mortality of strangulated inguinal hernia remains high. Late presentation is the most important determinant of this outcome. Constipation, abdominal distention, absent bowel sounds and redness of swelling are important pre-operative findings associated with higher morbidity and mortality.

**KEY WORDS:** Stangulated Inguinal Hernia, Post operative findings, Morbidity, Mortality

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## INTRODUCTION

Hernia is a common condition afflicting both men and women since time immemorial. The word itself is derived from a Greek word "hernios" which means branch or off shoot. The earliest recorded mention of an inguinal hernia was found in the Egyptian papyrus dating back to about 1500 BC. The dominance

of inguinal hernias amongst external hernias is universal.<sup>1</sup> Strangulation is the most important and potentially life threatening complication of inguinal hernia.<sup>2</sup>

The overall incidence of hernia itself and the incidence of its different complications especially strangulation is difficult to establish even in the developed countries.<sup>3</sup> In a developing country like Pakistan the incidence is likely to be even higher as people tend to present late due to lack of expert facilities, poverty, social taboos and lack of a structured health education programme and usually come to attention when some complication (e.g. Intestinal obstruction) has arisen.<sup>4</sup> True incidence can only be calculated if population at risk is known. This is very difficult in our circumstances. We, therefore, decided to study presentation, management and outcome of strangulated inguinal hernia in surgical department of Mayo Hospital.

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## PATIENTS AND METHODS

It was a prospective, observational study which included fifty consecutive patients, of either sex and above 12 years of age, who presented to the surgical emergency of Mayo Hospital with the complaint of irreducibility of inguinal hernia from July 2001 to July 2002.

It was assumed that every patient presenting to the emergency with an obstructed inguinal hernia and new onset pain had strangulation until proven otherwise.<sup>5</sup> Protocol also included all the patients fulfilling these criteria who subsequently died. No patient died in preoperative period, however. Only patients in pediatric age group (below 12 years) and patients not willing to be operated upon were excluded.

After admission the patient underwent thorough assessment and all the data was prospectively collected. The information recorded included; age, sex, detailed symptomatology at presentation including the chief complaint and related symptoms, duration of symptoms, past medical history, presence of coexisting diseases e.g. diabetes mellitus, hypertension, congestive cardiac failure or other cardiopulmonary diseases, ischemic heart disease etc. Important examination findings noted included vital signs, local examination of swelling including two dimensional sizes of swelling, findings on abdominal examination and bowel sounds. Other standard treatment measures (intravenous fluid/blood resuscitation, antibiotics, nasogastric aspiration etc.) were continued as necessary and not interfered for the purpose of the study alone. Also noted were operative findings and analysis of contents of hernial sac, and surgical procedure for repair. Other parameters noted included post operative recovery, complications, mortality and hospital stay.

## RESULTS

A total of 50 consecutive patients, above twelve years of age, were included in the study. Table-1 gives salient presenting features of strangulated inguinal hernia. Mean age at

presentation was  $56 \pm 20$  years. Twenty eight (56%) patients were between 51 to 80 years of age. Among the 50 patients who presented with strangulated hernia, there was only 2% female patient. The largest hernia presented was approx. 3015 cm<sup>2</sup> and the smallest one 33 cm<sup>2</sup>. The average size of hernia was 286 cm<sup>2</sup>. The time elapsed after the onset of strangulation and presentation was also quite variable. The shortest duration at presentation was one hour while longest one was 240 hours. The mean duration at presentation was  $36 \pm 51$  hours.

The most frequent strangulated content encountered during surgery was small intestine (ileum, 74%). Omentum was next in frequency (36%) followed by large gut (14%). Table-II shows frequencies with which various contents were encountered in strangulated hernia according to their viability status and Table-III gives operative procedures performed. A total of 32 procedures were done on 28 patients. The most frequently performed procedure were resection and anastomosis of ileum (44% of procedures), omentectomy (40%) and stoma formation (8%) Table-III.

Table-I: Presenting clinical features of patients with strangulated inguinal hernias (n=50)

Clinical feature	Number	%age
Pain in swelling	50	100
Redness of swelling	7	14
Generalized abdominal pain	35	70
Vomiting	33	66
Abdominal distention	16	32
Constipation	23	46
Tenderness of swelling	50	100
Irreducibility of swelling	50	100
Absent cough impulse	50	100
Tense (swelling)	43	86
Abdominal tenderness	38	76
Abdominal distention	18	36
Absent bowel sounds	26	52
Peritonitis	11	22
Shock (at presentation)	1	2

Table-II: Contents of hernial sac and their viability

Content	Patients with Content	Non-Viable Contents	Viable Contents
Ileum	37	17 (46%)	20 (54%)
Omentum	18	13 (72.2%)	5 (27.7%)
Large Gut	7	1 (14.3%)	6 (85.7%)
Testis	2	1 (50%)	1 (50%)
Meckle's	1	1 (100%)	0(0%)
Diverticulum			
Appendix	1	0(0%)	1 (100%)

Table-IV: Factors affecting outcome

Signs/ Symptoms	Odds ratio for viability	p Value	Odds ratio for death	p Value
Abdominal tenderness	0.854	0.325	1.152	0.516
Bowel sounds	2.201	0.012	0.813	0.069
Constipation	0.626	0.142	1.303	0.023
Abdominal distension	0.147	0.0001	3.071	0.003
Generalized pain	0.783	0.193	1.125	0.328
Peritonitis	0.41	0.001	2.144	0.000
Redness of swelling	0.46	0.008	1.587	0.018
Tenderness of swelling	0.60	0.40	-	-

In 46% of the cases operated, all the contents of hernial sac were viable and in another 46% all the contents were nonviable. In the rest (8%) among the double contents, one was viable. Important clinical characteristics and operative findings associated with viability of contents are presented in Table-IV and Table- V. Among the clinical features, presence of bowel sounds was an accurate predictor of gut viability Table-V. Abdominal distention when present was the strongest negative predictor of gut viability (Odds Ratio 0.147, P<0.0001). All the patients with features of peritonitis and redness of swelling had nonviable gut. Post-operatively the group with nonviable hernial sac contents again had more frequent incidence of various complications

In patients with viable contents peroperatively and with no postoperative

Table-III: Surgical Procedures performed and techniques of hernia repair used

Procedure (n=32)	Frequency	%age
Resection & anastomosis of illeum	14	44
Omentectomy	13	40
Ileostomy and mucus fistula	3	9
Colostomy of large gut	1	3
Orchiectomy	1	3

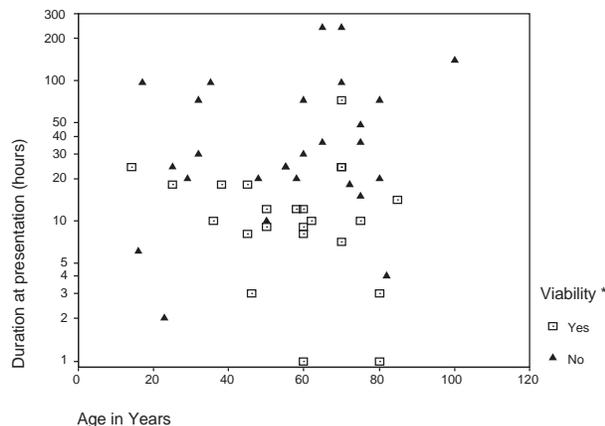
Type of repair (n= 50)	Frequency	%age
Darning	35	70
Obliteration of inguinal canal	11	22
Bassini	4	8

Table-V: Factors associated with unfavorable outcome

	Viable contents	Non Viable contents	p-Value	Alive	Dead	p-Value
Age	53.96	58.56	0.40	53.91	70.71	0.042
Duration	14.48	59.04	0.004	26.26	101.29	0.0001
Size of Swelling (cm <sup>2</sup> )	396.04	427.60	0.105	231.47	623.29	0.100
Stay (days)	4.26	5.35	0.231	-	-	-

complications, average hospital stay was 2-3 days. Patients who underwent gut resection or had other postoperative complications had a prolonged stay (6-8 days). Twenty patients (40%) developed some postoperative complication. These included pneumonia (lobar or bronchopneumonia) (20%) sepsis syndrome (14%) and local wound infection (6%). Septicemia carried the worst prognosis with 100% mortality.

There were 7 death giving a mortality figure of 14%. Factors associated with mortality included: age above 60 years, duration of strangulation of more than 48 hours, nonviability of gut and postoperative septicemia. Duration of symptoms turned out to be most important determinant of subsequent gut viability, post operative complications and death (Graph 1).



\*Viability of hernial sac contents

Graph-1: Viability of hernial contents according to age and duration at presentation

## DISCUSSION

The exact incidence of occurrence of strangulated inguinal hernia is difficult to establish. Attar Z previously reported an incidence of 9.6%.<sup>6</sup> Western studies variously described an incidence of 4-5%<sup>7, 8</sup> and 2.8%.<sup>9</sup> This study did not attempt to look for this incidence.

Strangulation of inguinal hernia may occur throughout life. The mean age at presentation in this study was  $56 \pm 20$  years. Andrews reported a sharp rise in incidence of strangulation after 60 years of age which peaks at 70-76 years.<sup>10</sup> Another western study observed an age range between 40-70 years.<sup>5</sup> A French study, however, noted most of patients (80%) who presented with strangulated inguinal hernia were below 45 years of age.<sup>11</sup> In the present study only one out of fifty patients was female. Various Western studies, however report a male to female incidence of 10:1 and 6:1.<sup>8</sup> A study in Pakistan showed no female presenting with strangulation among 65 patients.<sup>12</sup>

The duration of strangulation at presentation was very variable, the shortest being one hour and longest up to 240 hours. The mean duration at presentation was 36 hours with a rather wide SD of  $\pm 51$ . Western series also show that delay in presentation is not uncommon ranging from 1-8 days with 30% having duration of strangulation of more than 24 hours.<sup>7</sup> A recent study from Turkey shows similar figures

(1-4 days) with 35% presenting after 48 hours.<sup>13</sup> Delayed presentation (with lack of female representation) seems in accordance with our rather conservative social background.

The most frequent content encountered in hernial sac involved in strangulation was ileum. It was present alone or along with other contents in 74% of cases, which is similar to the incidence noticed by Raymond Pollock (70-80%).<sup>7</sup> Omentum as a sole content was present in 12% of cases. A western and a mediterranean studies noted an incidence of 10% and 27%, respectively, for omentum alone.<sup>5, 14</sup> Large gut was present in 14% of cases, the most frequent being sigmoid colon. Different western authorities have noted an incidence of 0% to 5% of large gut involvement in strangulation.<sup>5, 15</sup> Testis was present in 4% of cases and appendix and Meckel's diverticulum in 2% of the cases, each. Therefore, the three most frequent contents of a strangulated inguinal hernia were small gut, omentum, and large gut in descending order of frequency and this is mostly in accordance with other studies.

Gut (both small and large) was present in 44 out of 50 cases and in 18 out of 44 cases; it was nonviable (42%). In 6 out of 18 cases in which gut was nonviable, the duration of strangulation was less than 24 hours. This observation differs from that noted by Bowesman who did not note any incidence of gut nonviability if the duration of strangulation was less than 24 hours.<sup>16</sup> In the present study a gut resection rate of 33% was noted in bowel released within 24 hours of strangulation, which also differs from that described by Andrews and Bowesman.<sup>5, 16</sup> In the study done by former author resection rate of 7%, 11% and 27% was noted in gut released in less than 24 hours, 24-27 hours and after 48 hours respectively. Another study noted resection rate of 51% after 48 hours of strangulation.<sup>15</sup> Omentectomy was done in 13 cases including 8 cases in which omentum was released within 24 hours of strangulation. This is again in contradiction to that described by Bowesman.<sup>16</sup>

The most frequent postoperative complication was bronchopneumonia and basal lung col-

lapse. Complications related to chest occurred in 10 patients (20% incidence). In another large pulmonary complication occurred in 7% of patients.<sup>7</sup> Most of the patients developing pulmonary complications in the present study were beyond middle age and had long history of smoking. Half of these patients had past history of chronic obstructive pulmonary disease. All the patients with gangrenous intestines (6 out of 20) developed postoperative septicemia. Post operative incidence of septicemia was therefore 33% with nonviable gut. R&T noticed this rate to be 77%.<sup>17</sup> Postoperative wound infection developed in 6% of patients. All these patients had undergone gut resection.

Seven patients died in the post operative period (mortality rate of 14%). Various studies done previously on strangulated hernia attribute mortality to advanced age, duration of strangulation and presence of coexisting diseases. All the patients who died in this study were above 60 years of age. Hancock noticed a mortality rate of 5.4% at the mean age of 43 years rising to 11.5% at the mean age of 66 years in patients presenting with strangulated hernia.<sup>18</sup> A mediterranean study reported figures of 10% and 18.2% mortality at ages below and above 60 years respectively.<sup>14</sup> A 5 year long study in US army personnel reached similar conclusions.<sup>19</sup> Older persons have less physiological reserve to deal with stress.<sup>20</sup> None of the studies quoted above analyzed the contribution of age alone to the higher mortality. The contribution of coexisting diseases (e.g. diabetes mellitus, COPD etc) prevalent in older age is well recognized and described in all these studies. This study also noted a tendency at older age to present late (24.41 vs. 53.81 hours at below and above 60 years respectively). The mortality at above sixty years, however, remained statistically significant even after controlling for duration at presentation and concomitant diseases. The results, however, should be interpreted with caution because of rather small sample size.

Duration of strangulation at presentation is the most important determinant of the outcome regarding gut viability, resection-anastomosis

rate, morbidity and most importantly mortality. Andrews noted a mortality rate of 1.4%, 10% and 21% when strangulated hernia presented within 24 hours, 24-48 hours and after 48 hours respectively.<sup>10</sup> In the present series these rates were 2.86%, 40% and 50%.

It was noticed that absence of bowel sounds, distending abdomen, generalized abdominal tenderness as subtle evidence of peritonitis and redness and warmth of swelling were all associated with a high probability of finding nonviable gut which in turn is associated with higher post operative mortality. We could not find studies which analyzed the preoperative probability of such outcomes based on the presence of these clinical findings. The most probable reason of this could be that almost all the literature available on strangulated hernia is retrospective in nature.

It appears that dynamics of strangulation of contents of hernial sac and its vascular supply do not behave in a sufficiently predictable way to give uniform and comparable outcome based on the duration of strangulation, age of patient and other demographic variables as seen above in comparison of various studies. The clinical examination of local swelling and generalized signs may be more helpful in an individual case in predicting outcome and need to be looked into larger prospective studies as these signs and symptoms have not been adequately addressed in largely retrospective analysis of available data.

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