



## ORIGINAL ARTICLE

### CLINICAL OUTCOME OF USE OF MESH IN ACUTE HERNIA

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#### Abstract

**Background:** Mesh repair is now the gold standard technique of repair on incisional hernias. Infection of the mesh is a challenging complication of this type of repair. The risk of mesh infection has been shown to be greater in case of complicated hernia.

Incarceration of inguinal, umbilical and cicatricial hernias is a frequent problem. However, little is known about the relationship between the use of mesh and outcome after surgery. The goal of this study was to describe the relationship between the use of mesh in incarcerated hernia and the clinical outcome.

**Patients and Methods:** Correspondence, operation reports and patient files between January 2010 and December 2012 of patients presented at two hospitals in sohag and Assuit were searched for cases of: incarceration, strangulation and hernia. The patient characteristics, clinical presentation, pre-operative findings and clinical course were scored and analysed.

**Results:** A total of 183 patients could be identified: 68 inguinal, 48 umbilical, 35 incisional, 13 epigastric, 13 femoral, 3 trocar and 3 Spigelian hernias. In the statistical analysis, epigastric, femoral, trocar and Spigelian hernias were pooled, due to their small group sizes. One patient was excluded from the analysis because the hernia was not corrected during operation. In total, 90 hernias were repaired using mesh versus 92 primary suture repairs.

22 wound infections were registered (7%). One mesh was removed during a reintervention for anastomotic leakage, although no signs of wound infection were present. Nine patients died, none of them due to wound-related problems (one cardiovascular, one ruptured aneurysm, three pulmonary complications, two anastomotic leakage, two sepsis of unknown origin). Univariate analysis showed that female patients ( $P = 0.007$ ), adipose patients ( $P = 0.016$ ), patients with an umbilical hernia ( $P = 0.01$ ) and patients who underwent a bowel resection ( $P = 0.015$ ) had a significantly higher rate of wound infections. The type of repair (e.g. primary suture or mesh), use of antibiotic prophylaxis, gender, ASA (American Society of Anesthesiologists) class and age showed no significant relation with post-operative wound infection. After logistic regression analysis, only bowel resection ( $P = 0.020$ ) showed a significant relation with post-operative wound infection.

**Conclusions:** Wound infection rates are high after the correction of acute hernia, but clinical consequences are relatively low. Mesh correction of an acute hernia seems to be safe and should be considered in every incarcerated hernia.

**Keywords:** Hernia, Acute, Abdominal.

## INTRODUCTION

Mesh hernioplasty is the standard technique of repair for most types of hernias, including incisional hernias. Infection of the mesh is one of the most challenging complications of this technique. It usually requires additional surgical procedures for debridement and sometimes the excision of the mesh. This complication is even more challenging in low income environment.<sup>(1-2)</sup>

Data on the outcome of mesh repair of incarcerated ventral hernia are scarce. Present the case of salvage of a mesh placed on an incarcerated giant incisional hernia.<sup>(3)</sup>

Incarcerated hernias are frequently seen in the emergency ward. Usually, patients present with a painful swelling located on the ventral abdomen or groin. Some have signs of bowel obstruction, indicating incarceration or—at its worst—strangulation of the small or large bowel.<sup>(4)</sup>

The treatment of acute irreducible hernia consists of swift surgical exploration, with reduction of its contents and, if necessary, resection of ischaemic abdominal contents. Bowel resection produces a dilemma: the operation wound has become contaminated and is it, therefore, safe to use a mesh for correction? From the literature, it is known that primary suture repair in elective hernia repair increases the risk for recurrence—in many cases, leading to reoperation. This is the case in any type of abdominal wall hernia, whether ventral or inguinal.<sup>(5-6)</sup>

The use of mesh in elective hernia repair has increased during the last two decades following large multicentre randomised controlled trials proving its superiority over primary suture to prevent recurrence.<sup>(7-8)</sup> However, this superiority has not been proven for acute irreducible hernias. Some smaller studies comparing mesh versus suture repair for this indication have been published, all denominating mesh repair to be safe and effective.<sup>(9-13)</sup>

This study was performed to evaluate the use of mesh in acute hernia during the period January 2010 to December 2011. Wound complications in relation to the method of repair and patient characteristics were analysed in order to evaluate the safety of mesh repair in acute abdominal wall hernias.

## PATIENTS AND METHODS

All patient records, correspondence and operation reports between January 2010 and December 2012 at two hospitals were searched for the words 'hernia', 'acute', 'incarceration' and 'strangulation'. Patients in whom no incarcerated hernia was found during surgical exploration and patients who eventually underwent elective repair following manual reduction were excluded.

Of all patients, the sex, age, ASA classification, body mass index (BMI) and type of hernia were recorded.

Pre-operative recorded data included spontaneous reduction after the induction of anaesthetics, contents of the hernia sac, vitality of the contents and bowel resection. Post-operative data included post-operative wound complications and mortality. Statistical analysis was performed by stepwise multivariate logistical regression. P-values less than 0.05 were considered to be significant.

## RESULTS

A total of 183 patients could be identified: 68 inguinal, 48 umbilical, 35 incisional, 13 epigastric, 13 femoral, 3 trocar, and 3 Spigelian hernias (Table 1). In the statistical analyses, epigastric, femoral, trocar and Spigelian hernias were pooled into one group, due to the small sizes of the respective groups. One patient was excluded from the analysis because the hernia had not been repaired during the operation. Of all hernias, 90 were repaired using mesh versus 92 primary suture repairs. All were repaired using an open approach. The type of repair sorted by the type of hernia is displayed in Table.

A total of 22 wound infections were registered (12%). The distribution of wound infection, bowel resection and antibiotic prophylaxis is shown in (Table 2). One mesh was removed during a reintervention for anastomotic leakage. No signs of wound infection were present during this intervention. Nine patients died within 30 days after surgery; none of these deaths were related to wound problems (one cardiovascular, one ruptured aneurysm, three pulmonary complications, two anastomotic leakage, two sepsis of unknown origin). Of these patients, eight were ASA class 3 or 4 and four were operated 3 days or more after the onset of symptoms.

In the univariate analysis, female patients ( $P = 0.007$ ), overweight patients ( $P = 0.016$ ), patients with umbilical hernias ( $P = 0.010$ ) and patients who underwent a bowel resection ( $P = 0.012$ ) had significantly higher rates of wound infections. The BMI was known in only 75% of all patients and could not, therefore, be included in the logistic regression analysis. The type of repair (primary suture or mesh), use of antibiotic prophylaxis, gender, ASA classification and age showed no significant relations with post-operative wound infection.

Multivariate analysis showed that bowel resection is the major factor associated with wound infection (odds ratio [OR] = 3.53;  $P = 0.024$  for yes versus no resection).

Adjusted for this factor, no significant relation was found for the type of hernia ( $P = 0.27$ ) and type of repair ( $P = 0.129$ ).

Regarding recurrence after surgery; 12 patients recurred from 92 patients with primary suture repair. And 5 patients recurred from 90 patients how underwent repair (Table 4).

**Table 1. Types of Hernia in the study.**

Type of Hernia	Number	Percentage	Male	Female
Inguinal	68	37.4	60	8
Umbilical	48	25.6	20	28
Incisional	35	19.2	15	20
Epigastric	13	6.9	6	7
Femoral	13	6.9	4	9
Trocar	3	2.5	1	2
Spigelian	3	1.5	3	0
Total	183	100	109	74

**Table 2. Distribution of antibiotic prophylaxis, bowel resection and wound infection (mesh versus primary suture).**

Type of Hernia	Repair	AB prophylaxis	Bowel Resection	wound infection
(Mesh/Primary suture)				
Inguinal (68)	41/27	44/13	2/5	1/3
Umbilical (48)	15/28	16/21	1/6	2/7
Incisional(34)	17/17	19/10	3/2	2/3
Other (32)	17/20	10/11	3/1	1/3
Total	90/92	89/56	9/13	6/16

**Table 3. Bowel resection and wound infection after mesh or primary suture repair.**

Repair	Bowel resection	Wound infection
Primary suture	13	5
Mesh	9	2
Total	22	7

**Table 4. Rate of Recurrence after mesh or primary suture repair.**

Repair	No of Patients	No. of Recurrences	Percentage
Primary suture	92	12	13%
Mesh	90	5	5.5%
Total	182	17	

## DISCUSSION

Mesh repair remains the preferred treatment option for abdominal wall hernias, especially for large incisional hernias. Infection of an implanted mesh is the most feared complication of this type of repair and usually represents a major challenge. The incidence of mesh infection seems to depend on the approach. It has been estimated to be 1% with laparoscopic approach and up to 15% with open techniques.<sup>(1-4)</sup>

Even today, mesh repair is not routinely used in the repair of acute hernias. The most probable explanation for the use of primary suture repair is fear of post-operative wound complications, especially in cases in which small or large bowel is incarcerated in the hernia sac, sometimes even necessitating bowel resection. It is quite possible that the size of the defect influenced the choice of repair, but only 33% of surgeons reported the size of the defect in the operation report in case of umbilical and incisional hernias. Mainly umbilical hernias and incisional hernias are corrected using a primary suture repair in an acute setting. This will result in high recurrence rates, irrespectively of size, especially in incisional hernias.<sup>(6)</sup>

The question remains whether this preference for primary suture repair is rational. The fear of post-operative wound complications seems partially justified. We found that only in case of a bowel resection was the risk for wound infection elevated (Table 3). The type of hernia or the pre-operative condition of patients does not appear to influence the rate of wound infections in this group of patients. The consequences of wound infections in our study were relatively mild. Only one mesh was removed in a patient after an incisional hernia repair, due to anastomotic leakage and subsequent peritonitis. The mesh was situated in an onlay position and there was no indication of an ongoing wound infection at that time. All other wound infections could be treated using antibiotics and local wound dressings and were discharged in good clinical condition. Recent findings in the literature have suggested different approaches to mesh salvation. These include daily diffusion of antiseptics, antibiotic irrigation and vacuum systems.

In our study, we found a high incidence of complications and even nine deaths. Recently, other studies were performed evaluating a laparoscopic approach. Shah et al.<sup>(13)</sup> found no deaths in this study of 112 incarcerated ventral hernias repaired laparoscopically. Unfortunately, this study involved 103 chronic and only nine acute incarcerations. This might explain the difference in mortality, but in competent hands, the laparoscopic technique seems to be a safe option.

The results of this study show that it is safe to correct an incarcerated hernia with a mesh. Atila et al.<sup>(15)</sup> and

Legnani et al.<sup>(16)</sup> found the same low incidence of wound infections in acute hernia repaired with the use of prosthetic mesh. This also corresponds to other studies involving the use of prosthetic mesh in contaminated areas.<sup>(17-19)</sup>

Wound infection rates are relatively high, but cannot be considered a contraindication for the use of mesh and can be effectively treated using antibiotics and local wound dressings.

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