

## Original Article



# Association of The Size of Hernial Defect Over Post-Operative Outcomes Following Mesh Repair of Incisional Hernia

Md. Shahajahan ali<sup>1</sup>, Sayeed Bin Sharif<sup>2</sup>, Kazi Shah Md. Abdullah<sup>3</sup>

### Abstract

**Background:** Incisional hernia is a common complication of abdominal surgery. The success and post-operative outcomes of hernia repair depends upon many factors and out of these, the size of the hernial defect plays an important role. **Objectives:** To determine whether the size of the hernia defect had any impact over post-operative outcomes following prolene mesh repair of incisional hernia. **Materials and Methods:** Total 52 patients of incisional hernia who underwent prolene mesh repair by onlay technique were selected in this study. Patients were divided into three groups according to the size of hernial defect, as <5cm (small group), 5-10 cm (medium group) and >10cm (large group). **Result:** Respiratory problems were observed in 3 (42.9%) out of 7 subjects of hernial defect size >10 cm and 2 (6.2%) Out of 32 subjects of hernial defect size 5-10 cm. No subject of hernial defect size <5cm had respiratory problem. Wound infection was observed in 2 (15.4%) out of 13 subjects of hernial defect size <5 cm, 3(9.4%) Out of 32 subjects of hernial defect size 5-10 cm and 4(57.1%) out of 7 subjects of hernial defect size >10 cm. Pain was persistent in 3(5.8%) out of 52(100%) subjects more than 6 months after hernioplasty where 2 (28.6%) out of 7 subjects of hernial defect size >10 cm and 1(3.1%) out of 32 subjects of hernia defect size 5-10 cm. So, larger hernial defect was significantly associated with more pain persistence ( $p= 0.019$ ). **Conclusion:** Larger hernial defect is associated with more post-operative complications and increase morbidity.

**Key words:** Incisional hernia, Mesh repair, Size of hernial defect.

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### Introduction

Incisional hernia is a bulge or protrusion of peritoneum and abdominal contents that occurs near or directly along a prior abdominal incision or accidental wound. The exact incidence of incisional hernia is not known, but a number of reports in the literature suggest it in between 1% and 20%<sup>1</sup> and is more common in females, obese, older age group.<sup>2</sup> The predisposing factors for incisional hernia are advanced age, diabetes, obesity, malignancy, chronic steroid use, abdominal distension, chronic cough, constipation, urinary problem as prostatism, poor technical closure, post-operative wound hematoma, wound infection, atelectasis and chest infection.<sup>3</sup> Incisional hernia usually starts early after surgery, as a result of failure of the lines of closure of the abdominal wall following laparotomy. If left unattended they tend to attain large size and cause discomfort to the patient or may lead to

strangulation of abdominal contents. Recent studies show that about 2/3<sup>rd</sup> of incisional hernia appear within the first 5 years and 1/3<sup>rd</sup> appear 5 to 10 years after the initial operation.<sup>4</sup> Treatment of incisional hernia is repair of the defect. Various types of repair have been practiced, starting from anatomical repair to prosthetic mesh repair which is done by open or laparoscopic method. The introduction of prosthetics revolutionized hernia surgery with the concept of a tension-free repair.<sup>5</sup> Mesh repair is an excellent method and is the gold standard for incisional hernia especially for patients with large defect. Different types of meshes are now available with different size i.e. absorbable (vicryl mesh), non-absorbable (Prolene mesh), and Composite mesh (Vypro, Proceed<sup>®</sup> Surgical Mesh). Out of this, composite mesh is more tissue friendly but costly than prolene mesh. Laparoscopic technique of hernia repair has revolutionized the treatment of incisional

1. Junior Consultant (Surgery), Medical College and Hospital, Dinajpur, Bangladesh.

2. Assistant Professor Surgery, KhwajaYounus Ali medical college and Hospital, Enayetpur, Dinajpur, Bangladesh.

3. Assistant Surgeon, 100 beded Sadar Hospital, Shariatpur, Bangladesh.

**Correspondence:** Md. Shahajahan ali, Junior consultant (Surgery), Md. Abdur Rahim Medical College and Hospital, Dinajpur, Bangladesh. Mobile: 01712876407, Email: shahajahandjmc@gmail.com

hernia by reducing the morbidity and less hospital stay but costly and needs more skilled manpower. It is suitable for small and uncomplicated hernia. On the other hand, in open methods, we can repair all form of incisional hernia including large and complicated one where Inlay, Onlay or Sublay mesh placement are practiced. The main cause of morbidity and recurrence following incisional hernia repair is associated with the size of the hernial defect.<sup>6</sup> White<sup>7</sup> stated that the use of prosthetic mesh and hernia defect more than 10cm were associated with significantly more wound complications. So, a research work was designed to see the association of the size of the hernial defect with post-operative outcomes following prolene mesh repair of incisional hernia by open method (onlay).

### Materials and Methods

This prospective cross sectional study was carried out in Sir Salimullah Medical College and Mitford Hospital, Dhaka from December 2010 to June 2012. Purposive sampling was done from all patients of incisional hernia admitted in that time period. Exclusion criteria was patient with hypo-proteinaemia, anemia, jaundice and other comorbid diseases like cirrhosis, intra-abdominal malignancy, renal failure, ischemic heart disease were excluded from this study. Patients having recurrent incisional hernia and those whose hernia repair was secondary to other procedures were also excluded. Fifty two patients were selected as sample. The fascial gap in the abdominal wall of incisional hernia patient was denoted as the size of the hernial defect which was measured by the largest distance in width or length in cm. This was calculated according to the guideline of an International panel of ten experts met under the auspices of the European Hernia Society (GREPA),<sup>8</sup> into three groups- Small (highest gap <5 cm in width or length), Medium (highest gap 5-10cm in width or length) and Large (highest gap >10cm in width or length). In all cases, the hernial gap were measured and confirmed after providing anesthesia. Tension free mesh repair were performed irrespective of the size and site of hernia using prolene mesh in onlay technique with appropriate size and keeping a negative suction drain in proper position with prophylactic antibiotics. Postoperatively, the patients were observed for surgical wound bleeding, wound infection, seroma formation, fever, abdominal pain, distension or any respiratory problem. Patients were discharged and asked for clinical follow up after 2 weeks, 1 month, 6 months and 12 months following operation. During these visits, they were looked for any evidence of complications like seroma, stitch sinus formation, mesh sepsis, chronic wound pain and recurrence. Findings were recorded on a preformed proforma and all postoperative outcomes were analyzed and correlate it with the size of the hernial defect. Data were processed and analyzed by using computer based programmed SPSS-16.

### Results

**Table I:** Distribution of risk factors in the study subjects (n=52).

Risk Factors	n (%)
<b>Respiratory problem</b>	
Present	07(13.50)
Absent	45(86.50)
<b>Urinary problem</b>	
Present	08(15.40)
Absent	44(84.60)
<b>Obesity</b>	
Present	06(11.50)
Absent	46(88.50)
<b>Smoking</b>	
Yes	12(23.30)
No	40(76.70)
<b>Diabetes Mellitus</b>	
Present	02(03.80)
Absent	50(96.20)

Table I shows the distribution of risk factors in the study subjects. Commonest risk factor was smoking (23.3%), next common being urinary problem (15.4%).

**Table II:** Gender distribution of the subjects according to the size of hernial defect (n=52).

Group	Gender		Total n(%)
	Male n (%)	Female n (%)	
<5 cm	5 (9.6)	8(15.4)	13(25)
5-10 cm	8(15.4)	24(46.1)	32(61.5)
>10 cm	0(0)	7(13.5)	7(13.5)
<b>Total</b>	13(25)	39(75)	52(100)

$\chi^2=3.5, p=0.16$

Table II shows the Gender distribution of the subjects according to the size of hernial defect. In 52 study subjects, 13(25%) were male and 39 (75%) were female. Out of 13(25%) subjects of hernial defect size <5 cm, 5(9.6%) were male and 8 (15.4%) were female. Out of 32(61.5%) subjects of hernial defect size 5-10 cm, 8(15.4%) were male and 24(46.1%) were female. Out of 7(13.5%) subjects of hernial defect size >10cm, 7(13.5%) were female and no male.

**Table III:** Association of the size of hernial defect with post-operative wound hematoma.

Group	Wound Hematoma		Total n (%)
	Yes n (%)	No n (%)	
<5 cm	0(0)	13(100)	13(100)
5-10 cm	1(3.1)	31(96.9)	32(100)
>10 cm	1(14.3)	6(85.7)	7(100)
<b>Total</b>	2(3.8)	50(96.2)	52(100)

Table III shows the association of the size of hernial defect with post-operative wound hematoma following prolene mesh repair of incisional hernia. Hematoma was observed in 1(14.3%) out of 7 subjects of hernial defect size >10 cm and 1(3.1%) out of 32 subjects of hernial defect size 5-10 cm. Total 2(3.8%) subjects out of 52 had experience of wound hematoma. Chi square test showed not significant. So, hernial defect size was not significantly associated with wound hematoma (p= 0.269).

**Table IV:** Association of the size of hernial defect with post-operative respiratory problem.

Group	Post-operative respiratory problem		Total n (%)
	Yes n(%)	No n(%)	
<5 cm	0(0)	13(100)	13(100)
5-10 cm	2(6.2)	30(93.8)	32(100)
>10 cm	3(42.9)	4(57.1)	7(100)
<b>Total</b>	5(9.6)	47(90.4)	52(100)

$\chi^2=10.700$ ,  $p= 0.005$ , Values in parentheses are percentages.

In table IV, Respiratory problems were observed in 5(9.6%) subjects out of 52 where 3(42.9%) out of 7 subjects of hernial defect size >10 cm and 2(6.2%) out of 32 subjects of hernial defect size 5-10 cm. No subject of hernial defect size <5 cm had respiratory problem. Chi square test showed significant association between the size of the hernial defect and post-operative respiratory problem (p=0.005).

**Table V:** Association of the size of hernial defect with wound infection.

Group	Wound Infection		Total n (%)
	Yes n(%)	No n(%)	
<5 cm	2(15.4)	11(84.6)	13(100)
5-10 cm	3(9.4)	29(90.6)	32(100)
>10 cm	4(57.1)	3(42.9)	7(100)
<b>Total (%)</b>	9(17.3)	43(82.7)	52(100)

$\chi^2=9.2$ ,  $p= 0.01$

Table V shows the association of the size of the hernial defect with wound infection. Wound Infection was observed in 2 (15.4%) out of 13 subjects of hernial defect size <5 cm, 3(9.4%) out of 32 subjects of hernial defect size 5-10 cm and 4(57.1%) out of 7 subjects of hernial defect size >10 cm. In 52 study subjects, total 9 (17.3%) subjects had experience of wound infection. Chi square test showed significant association between size of the hernial defect and wound infection (p=0.01).

**Table VI:** Association of the size of hernial defect with wound dehiscence

Group	Wound dehiscence		Total n (%)
	Yes n(%)	No n(%)	
<5 cm	0(0)	13(100)	13(100)
5-10 cm	2(6.2)	30(93.8)	32(100)
>10 cm	1(14.3)	6(85.7)	7(100)
<b>Total</b>	3(5.8)	49(94.2)	52(100)

$\chi^2=1.743$ ,  $p= 0.418$ , Values in parentheses are percentages.

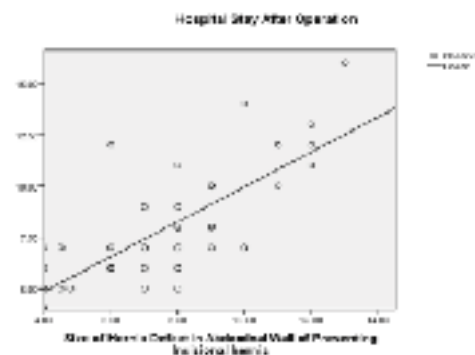
In table VI, Wound dehiscence was found in 3(5.8%) subjects out of 52 where 1(14.3%) subject had hernial defect >10 cm and 2(6.2%) had hernial defect between 5 to 10 cm. Chi square test showed not significant. So, hernial defect size was not significantly associated with wound dehiscence (p= 0.418).

**Table VII:** Association of the size of hernial defect with post-operative seroma formation.

Group	Seroma		Total n (%)
	Yes n(%)	No n(%)	
<5 cm	0(0)	13(100)	13(100)
5-10 cm	7(21.9)	25(78.1)	32(100)
>10 cm	4(57.1)	3(42.9)	7(13.5)
<b>Total</b>	11(21.2)	41(78.8)	52(100)

$\chi^2=8.934$ ,  $p=0.011$ , Values in parentheses are percentages.

Table VII shows the association of the size of the hernial defect with post-operative seroma formation. Seroma was found in 11(21.2%) out of 52 subjects where 4(57.1%) out of 7 subjects of hernial defect size >10 cm and 7(21.9%) out of 32 subjects of hernial defect size 5-10cm. Larger hernial defect was significantly associated with more seroma formation (p= 0.011).



**Figure 1:** Correlation Coefficient between the size of the hernial defect with post-operative hospital stay

In Figure 1, Linear graph shows the significant correlation of the size of the hernial defect with post-operative hospital stay following prolene mesh repair of incisional hernia ( $r=0.785$ ,  $p=0.0001$ ).

## Discussion

Incisional hernia starts as asymptomatic partial disruption of the deeper layers of abdominal wound during the immediate or early post-operative period.<sup>9</sup> The use of prosthetic mesh to repair incisional hernia revolutionized hernia surgery.<sup>10</sup> In this study, a total of 52 patients were studied. The mean ( $\pm$ SD) age of the patients was 45.15 ( $\pm$ 12.72) years and the youngest and oldest one were 22 and 75 years old respectively. Among them 13 (25%) were male and 39 (75%) were female [Table II]. 13 (25%) patients had hernial defect  $<5$ cm where 5 (9.6%) were male and 8 (15.4%) were female, 32 (61.5%) had hernial defect between 5 to 10cm where 8 (15.4%) were male and 24 (46.1%) were female and 7 (13.5%) had hernial defect  $>10$  cm where all were female, no male. [Table II]. So male/female ratio was 1:3. Obstetrical emergency, usually are dealt by junior and trainee surgeons and the poor surgical technique during Caesarian section may play an important role for occurrence of incisional hernia. Al-Hawaz<sup>11</sup> found 62 (56.36%) female out of 110 patients, Ellis<sup>12</sup> found 64.6% female out of 383 patients. Goel and Dubey<sup>13</sup> in their series found male to female ratio was 1:1.25. Distribution of risk factors in the study subjects were smoking 23.3%, urinary problem 15.4%, respiratory problem 13.5%, obesity 11.5% and diabetes mellitus 3.8% [Table I]. Bose<sup>14</sup> in his study found obesity 30%, COPD 20.90% and stricture urethra 9.09%. In this study, post-operative wound hematoma was observed in 2 (3.8%) patients out of 52 where 1 (14.3%) out of 7 patients of hernial defect size  $>10$  cm and 1 (3.1%) out of 32 patients of hernial defect size 5-10 cm. Hematoma was not significantly associated with the size of the hernial defect ( $\chi^2=2.628$ ,  $p=0.269$ ) [Table III]. But, Al-Hawaz<sup>11</sup> found 10% patients had wound hematoma after placement of large sized prolene mesh in repair of large incisional hernia. It might be due to inappropriate hemostasis. Postoperative respiratory problems like cough were observed in 5 (9.6%) patients where 3 (42.9%) out of 7 had hernial defect size  $>10$  cm and 2 (6.2%) out of 32 had hernial defect size 5-10 cm. No patients of hernial defect size  $<5$  cm had respiratory problem. So, respiratory problem was significantly associated with larger hernial defect ( $\chi^2=10.70$ ,  $p=0.005$ ) [Table IV]. In larger hernia, needs more tissue dissection, more nerve injury, more pain and thus patient not take full breath which may cause atelectasis and more cough. Besides this, in larger hernia more contents may need to accommodate in abdominal cavity that increase intra-abdominal pressure and diaphragm in pressure leading to more respiratory problem. All patients were treated with early ambulation, breathing exercise, chest physiotherapy and nebulization (if needed). Novitsky<sup>15</sup> reported 6.25% of patients had respiratory problem, Wound infection was observed in 9 (17.3%) patients where 2 (15.4%) out of 13 patients of hernial defect size  $<5$  cm, 3 (9.4%) out of 32

patients of hernial defect size 5-10 cm and 4 (57.1%) out of 7 patients of hernial defect size  $>10$  cm. So, wound infection was significantly associated with larger hernial defect ( $\chi^2=9.2$ ,  $p=0.01$ ) [Table V]. In larger hernia, more tissue dissection, more operative time, more exposure of wound, creating more potential space may be the explanations in favor of infection. Whiteley<sup>16</sup> stated that the use of prosthetic mesh and hernia defect more than 10 cm were associated with significantly more wound infections. Al-Hawaz<sup>11</sup> found 9.1% patients had wound infection after placement of large sized prolene mesh in repair of large incisional hernia. Zarin<sup>17</sup> reported post-operative wound infection in 14% patients and more in large hernia following mesh repair. In spite of judicious use of prophylactic antibiotics, the values of wound infection in this study are bit higher as compared to other studies. Wound Dehiscence was found in 3 (5.8%) patients out of 52 where 1 (14.3%) out of 7 patients of hernial defect size  $>10$  cm and 2 (6.2%) out of 32 patients of hernial defect size 5-10 cm. Chi square test shows not significant, so, wound dehiscence was not significantly associated with the size of hernial defect ( $\chi^2=1.743$ ,  $p=0.418$ ) [Table VI]. These patients were treated by simple debridement and dressing and two patients needed re-suturing. Zarin<sup>17</sup> reported wound dehiscence in his study 4(3.3%) out of 77 patients which is nearly consistent with the findings of this study. Seroma was found in 11(21.2%) patients out of 52 as the most common post-operative complications in this study where 4(57.1%) out of 7 subjects of hernial defect size  $>10$  cm and 7(21.9%) out of 32 subjects of hernial defect size 5-10cm and no seroma found in  $<5$ cm group. So, larger hernial defect was significantly associated with more seroma formation ( $\chi^2=8.934$ ,  $p=0.011$ ) [Table VII]. Larger hernial defect need more tissue dissection during repair predispose to accumulate more secretion of tissue fluid. Zarin<sup>17</sup> found post-operative seroma in 28.9% patients, Al-Hawaz<sup>11</sup> found 17.3% patients and most of them occurred in larger hernia group. Matapurkar<sup>18</sup> found no seroma formation out of 60 patients in their study; it might be due to incorporation of the mesh into a peritoneal sandwich. Majority of these patients were treated by single or repeated aspirations and one patient requiring incision and drainage of seroma cavity 3 months later. Study shows that the significant correlation of the size of the hernial defect with post-operative hospital stay following mesh repair( $r=0.785$ ,  $p=0.0001$ ) [Figure 1]. In larger hernia, long incision, more tissue dissection, long period of keeping drain in position and pain may be the explanation in favor of staying more in hospital post-operatively. Akinci<sup>19</sup> stated that 62% patients leave hospital within 5 days, 30% between 5 to 7 days and 8% leave hospital after 7 days of operation depending upon defect repaired. Khaira<sup>20</sup> stated that post-operative in-hospital stay ranged from 1 to 27 days with a mean of 6.2 days depending upon the hernial defect i.e. larger the hernial defect more days to stay in hospital.

## Conclusion

From the observation and analysis of the collected data, it can be concluded that larger hernial defect is associated with more

post-operative complications. So, post-operative morbidity is proportionately associated with the different size of the hernial defect and meticulous dissection, appropriate placement of mesh can reduce them but still it will be needed a large sample size and multicentric study to comment upon the actual outcome.

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