

# COMPARISON OF ABDOMINAL BINDER USE VERSUS NO ABDOMINAL BINDER USE AFTER VENTRAL ABDOMINAL WALL HERNIA REPAIR: A RANDOMIZED CONTROLLED TRIAL

MUHAMMAD AKRAM DOGAR<sup>1</sup>, WASIF MAJEED CHAUDHRY<sup>2</sup>, GOHAR RASHEED<sup>3</sup>, ADNAN SADIQ<sup>4</sup>  
BUTT, ADEEL RIAZ<sup>1</sup>, MUHAMMAD AYAZ<sup>4</sup>

<sup>1</sup> Department of Surgery, Central Park Medical College Lahore (CPMC). <sup>2</sup> Department of Surgery, Lahore Medical & Dental College (LMDC). <sup>3</sup> Department of Surgery, Rawalpindi Medical University (RMU).

<sup>4</sup>Department of Surgery, Postgraduate Medical Institute (PGMI/LGH)

Corresponding author: Dr. Muhammad Akram Dogar, Associate Professor of surgery, Contact: +923335434247  
Email: makramdogar@gmail.com, Address: Central Park Medical College Lahore

## Abstract

**Background:** Hernia repair is most common surgical procedure in a surgical setting. Ventral hernias are defined as non-inguinal, no hiatal defect in abdominal wall fascia. Abdominal binders are usually recommended in routine after repair of ventral hernias. Abdominal binder is a belt which is wide enough to surrounds the abdominal region and supports the wound. Findings reported in previous studies are better with binders.

**Objective:** To compare the outcome of binder use versus no abdominal binder use after ventral abdominal wall hernia repair

**Material & methods:** This Randomized Controlled Trial was done at Department of Surgery, Central Park Teaching Hospital Lahore for 6 months. Sixty patients were included and underwent ventral hernia repair under general anesthesia. Then patients were randomly divided in two groups. Group A for Abdominal Binder and Group B for without Abdominal Binder by using lottery method. During 6 weeks, patients were followed-up in OPD fortnightly. Patient were evaluated for pain, Pulmonary Function Assessment on spirometer, Physical Function Assessment by 6 minutes' walk test, Seroma formation assessment, wound infection, wound dehiscence and patients satisfaction. Data was analyzed in SPSS version 20.

**Results:** In this study, the mean age of patients was 42.36±8.52years in binder group while 45.11±10.22years in non-binder group. There were 12 males and 18 females in binder group while 16 males and 14 females in non-binder group. At the end of study, the mean pain score was 0.0±0.0 in binder group while 0.7±0.1 in non-binder group ( $p<0.05$ ), the mean FEV1 was 90.21±6.39 in binder group while 89.91±12.30 in non-binder group ( $p>0.05$ ) and the mean 6MWT was 559.49±52.10m in binder group while 514.79±42.39m in non-binder group ( $p<0.05$ ). Seroma formation occur in 2 (6.7%) cases in binder group while in 8 (26.7%) in non-binder group ( $p<0.05$ ). Wound infection occurred in 1 (3.3%) in binder group while in 6 (20%) cases of non-binder group ( $p<0.05$ ) While wound dehiscence was not observed in any case in binder group (0%) but in 2 (6.7%) cases in non-binder group ( $p>0.05$ ).

**Conclusion:** Thus results of this study showed that abdominal binder can help to improve the physical condition as well as can well manage wound.

**Key words:** Ventral hernia, laparotomy, abdominal binder, pain, abdominal wall

## INTRODUCTION

Hernia is a protrusion of intestines through an opening in the muscles of abdominal wall cavity that covers it.<sup>1</sup> Ventral hernias of the abdomen are defined as a non-inguinal, no hiatal defect in the fascia of the abdominal wall.<sup>2</sup> In 2006, 348,000 ventral hernia repairs were performed in the United States, and it was estimated to cost approximately \$3.2 billion.<sup>4</sup> Sangwan et al., found prevalence of inguinal hernia 76.4%, para umbilical hernia 12.38%, umbilical hernia 3.95% while and

incisional hernia 2.7% in Pakistan. The incidence of hernia was higher in men (67.3%) than women (32.7%).<sup>5</sup> The prevalence of ventral hernia depends on the associated risk factors. These factors include age, gender, prolonged constipation, coughing, obesity, multiple pregnancies, smoking, gym or heavy-lifting, previous abdominal surgeries and genetics.<sup>6</sup>

In a surgical setting, hernia repairs are the most common surgeries performed. Every year, >20 million hernia repairs are done all over the world. However, the

surgical management of hernia is ignored as the public-health importance in developing countries, although it is very cost-effectiveness.<sup>7</sup> Hernia of abdominal wall is very common presentation in a surgical setting and it accounts for 15-18% of all surgeries.<sup>8</sup>

Various imaging techniques are required to confirm the presence of incisional hernia. The first diagnostic approach to incisional hernia remains planar abdominal X-ray in two projections. Indeed, x-ray, though can be done easily, suitable and low-cost, and can only detect the bowel loops present inside the hernia sac, pointing out both; centrally & peripherally occlusive phenomena, if it is present, and free air is also detected as sign of bowel perforation.<sup>9</sup> X-ray cannot fund all essential morphological structural information of abdominal wall, lesion site and probable complications, which can grow inside hernia sac because of obstruction.<sup>9,10</sup>

Presently, several surgical techniques of hernia repair are applied, like simple closure, laparoscopy, Mayo duplication, prosthetic-implantation in onlay & sublay mesh and also auto-dermal plasty. The selection of operative technique is mainly depend on the preference of the surgeon and financial background of clinical setting.<sup>11</sup> Laparoscopic repair is gaining popularity as an alternative technique for hernia repair of abdominal wall. Despite, several trials assessing this method, warnings for laparoscopy are not yet established.<sup>12</sup>

A potential non-pharmacologic way to reduce postoperative pain and bleeding is using an abdominal binder during postoperative recovery.<sup>13</sup> Postoperatively, elastic binders for abdominal region like abdominal belts, girdles, trusses, lorgnette, etc. are normally applied in routine.<sup>14</sup> Elastic or abdominal binder is the belt, which is wide and can support the incision in abdominal region after surgery.<sup>14</sup> The needed outcomes include relief in pain, less chances of seroma formation, better respiratory function and postural consistency. On positive side, results of few studies suggests that abdominal binders reduce the post-operative pain, seroma formation, emotional distress as well as post-operative discomfort. Abdominal binders are also directed to improve mobilization, protect wound and thus help in coughing and improve respiratory function.<sup>15</sup> So the beneficial role of the abdominal binders doing postoperative recovery process, should not be disregarded.<sup>16</sup>

So we conducted this study to get the evidence for confirmation of more appropriate way to manage hernia. Literature showed that binder use can help to improve the outcome of hernia repair. But not much work was found and also local evidence was missing.

So we conducted this study to get results for local population and apply results of this study in local setting.

## OBJECTIVE

To compare the outcome of abdominal binder use versus no abdominal binder use after ventral abdominal wall hernia repair

## MATERIAL & METHODS

**Study design:** Randomized Controlled Trial

**Setting:** Department of Surgery, Central Park Teaching Hospital, Lahore

**Duration:** 6 month i.e. January 2019 to June 2019

**Sample size:** Total sample size of 60 cases (30 in both groups) is calculated with 80% power of study, 5% significance level and taking expected percentage of improved physical function i.e. 80%<sup>14</sup> with binder and 48%<sup>14</sup> without binder after hernia repair

**Sampling technique:** Non-probability, consecutive sampling

**Sample selection:**

**Inclusion:** Patients aged 16-60 years, either gender presented with ventral (Paraumbilical/Epigastric/Incisional) hernia and planned to undergo hernia repair under general anesthesia

**Exclusion:** Patients with ASA III or IV, diabetes (BSR>200mg/dl), COPD/COAD, CLD with cirrhosis/Ascites, Cardiac Failure, Renal Failure, Abdominal Kocks or intra-abdominal Malignancy, pregnant females, obstructed / strangulated Hernia, BMI >45kg/m<sup>2</sup>, patients on steroid / immunosuppressive therapy were excluded

**Data collection procedure:** 60 patients fulfilled the selection criteria were enrolled in the study through wards of surgical department. Informed consent were obtained and demographics were noted. Then patients were randomly divided in two groups. Group A for Abdominal Binder and Group B for without Abdominal Binder by using lottery method. Pre-operatively, patients were prescribed clipping of hairs from site of surgery on day of Surgery, Inj Augmentin/ Cephadrine I/V 1-2hrs and Inj Toradol 30mg I/V 1-2 hrs. Then surgery was done as per standard protocol by a single surgical team. In group A, Abdominal Binder was applied immediate post operatively continue for 6 weeks i.e. 24 hrs a day for one week and then apply for >12hrs/day mostly during sitting and standing. But in group B, no binder was applied. After surgery, patients were prescribed Antibiotics; I/V for 48 hrs/6 doses days then oral for 5 days. Inj Ketorolac I/V BD for 4 doses, Inj Provas 1g TDS for 6 doses, Inj Nalbuphine as required or if pain on VAS>4. Then patients were

followed-up in OPD for 6 weeks. During 6 weeks, patients were followed-up in ODP fortnightly. On each visit patient was evaluated for pain, Pulmonary Function Assessment on spirometer, Physical Function Assessment by 6 minutes' walk test, Seroma formation assessment, wound infection, wound dehiscence and patient's satisfaction.

**Data analysis:** Data was analyzed in SPSS version 20. Both groups were compared by applying chi-square test for categorical outcome and independent samples t-test for quantitative outcome variable. P-value ≤ 0.05 was considered as significant.

**RESULTS**

In this study, the mean age of patients was 42.36±8.52years in binder group while 45.11±10.22years in non-binder group. There were 12 males and 18 females in binder group while 16 males and 14 females in non-binder group. The mean BMI of binder group was 29.89±12.03kg/m<sup>2</sup> while mean BMI of non-binder group was 30.33±17.13kg/m<sup>2</sup>. The mean duration of hernia was 3.47±0.25years in binder group while 4.11±1.89years in non-binder group. There were almost similar number of patients of para-umbilical hernia i.e. 13 vs. 12 in both groups respectively. Epigastric hernia was present in 10 patients randomized to binder group while in 9 patients randomized to non-binder group and incisional hernia was present in 7 patients randomized to binder group while in 9 patients randomized to non-binder group. Table 1

At baseline, the mean pain score was 5.1±1.4 in binder group while 5.3±1.2 in non-binder group (p>0.05). After 2 weeks (15 days), the mean pain score was 2.3±0.7in binder group while 3.4±1.8 in non-binder group (p<0.05). After 4 weeks, the mean pain score was 1.1±0.3 in binder group while 1.9±0.9in non-binder group (p<0.05). After 6 weeks, the mean pain score was 0.0±0.0in binder group while 0.7±0.1 in non-binder group (p<0.05). Seroma formation occur in 2 (6.7%) cases in binder group while in 8 (26.7%) in non-binder group (p<0.05). Wound infection occurred in 1 (3.3%) in binder group while in 6 (20%) cases of non-binder group (p<0.05) While wound dehiscence was not observed in any case in binder group (0%) but in 2 (6.7%) cases in non-binder group (p>0.05). At baseline, the mean FEV1 was 77.58±22.17in binder group while 79.85±16.32in non-binder group (p>0.05). After 2 weeks (15 days), the mean FEV1 was 80.11±9.36 in binder group while 83.29±12.16in non-binder group (p>0.05). After 4 weeks, the mean FEV1 was 85.36±12.34in binder group while 86.66±7.89in non-binder group (p>0.05). After 6 weeks, the mean FEV1 was 90.21±6.39in binder group while 89.91±12.30in

non-binder group (p>0.05). At baseline, the mean 6MWT was 412.01±88.96m in binder group while 422.30±74.59m in non-binder group (p>0.05). After 2 weeks (15 days), the mean 6MWT was 479.67±90.99m in binder group while 435.54±65.41m in non-binder group (p<0.05). After 4 weeks, the mean 6MWT was 521.89±74.12m in binder group while 487.00±55.64m in non-binder group (p<0.05). After 6 weeks, the mean 6MWT was 559.49±52.10m in binder group while 514.79±42.39m in non-binder group (p<0.05). Table 2

**Table 1:** Baseline characteristics of patients

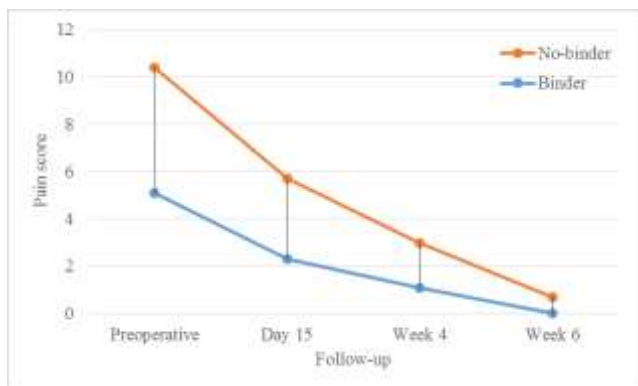
	Binder	No-binder
N	30	30
Age (yr)	42.36±8.52	45.11±10.22
Gender (M:F)	12:18	16:14
Duration of hernia (yr)	3.47±0.25	4.11±1.89
BMI	29.89±12.03	30.33±17.13
Type of hernia		
Para-umbilical	13	12
Epigastric	10	9
Incisional	7	9

**Table 2:** comparison of outcome in both groups

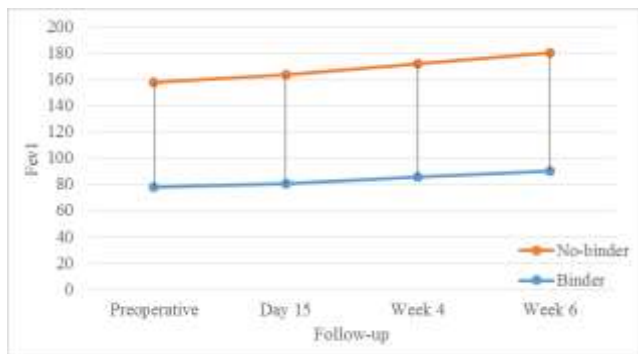
	Binder	No-binder	p-value
n	30	30	
Pain			
Preoperative	5.1±1.4	5.3±1.2	0.555
Day 15	2.3±0.7	3.4±1.8	0.003
Week 4	1.1±0.3	1.9±0.9	<0.000 1
Week 6	0.0±0.0	0.7±0.1	<0.000 1
Seroma formation	2	8	0.038
Wound infection	1	6	0.044
Wound dehiscence	0	2	0.472
FEV1			
Preoperative	77.58±22.17	79.85±16.32	0.653
Day 15	80.11±9.36	83.29±12.16	0.261
Week 4	85.36±12.34	86.66±7.89	0.629
Week 6	90.21±6.39	89.91±12.30	0.906
6 minute walk (m)			
Preoperative	412.01±88.96	422.30±74.59	0.629
Day 15	479.67±90.99	435.54±65.41	0.035
Week 4	521.89±74.12	487.00±55.64	0.044
Week 6	559.49±52.10	514.79±42.39	0.0006

Fig 1 showed significant decrease in pain score in both groups, although binder group showed more

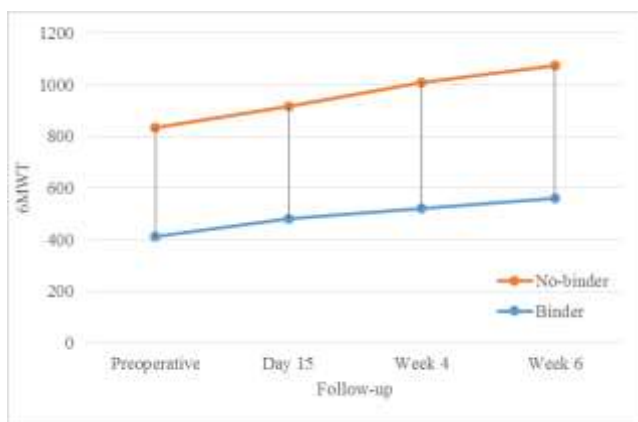
decrease in pain score. Fig 2 showed significant improvement in respiratory function in both groups, although binder group showed more improvement in respiratory function but the difference was insignificant. Fig 3 showed significant improvement in 6MWT in both groups, although binder group showed significantly more improvement in 6MWT.



**Fig 1:** Showing trend of pain score reduction in both groups during follow-up



**Fig 2:** Showing trend in FEV1 improvement in both groups during follow-up



**Fig 3:** Showing trend in 6minute walk improvement in both groups during follow-up

## DISCUSSION

Elasticized abdominal binders provide a non-invasive intervention for enhancing recovery of walk performance, controlling pain and distress, and improving patients' experience following major abdominal surgery including hernia repair.<sup>17</sup> A potential non-pharmacologic way to reduce postoperative pain and bleeding is using an abdominal binder during postoperative recovery.<sup>13</sup> Some surgeons recommend the abdominal binders after surgery for ease of the patient and to avert the wound complications.

In our trial, at baseline, the mean pain score was  $5.1 \pm 1.4$  in binder group while  $5.3 \pm 1.2$  in non-binder group ( $p > 0.05$ ). After 2 weeks (15 days), the mean pain score was  $2.3 \pm 0.7$  in binder group while  $3.4 \pm 1.8$  in non-binder group ( $p < 0.05$ ). After 4 weeks, the mean pain score was  $1.1 \pm 0.3$  in binder group while  $1.9 \pm 0.9$  in non-binder group ( $p < 0.05$ ). After 6 weeks, the mean pain score was  $0.0 \pm 0.0$  in binder group while  $0.7 \pm 0.1$  in non-binder group ( $p < 0.05$ ). There is a significant decrease in pain score in both groups, although binder group showed more decrease in pain score.

Seroma formation occur in 2 (6.7%) cases in binder group while in 8 (26.7%) in non-binder group ( $p < 0.05$ ). Wound infection occurred in 1 (3.3%) in binder group while in 6 (20%) cases of non-binder group ( $p < 0.05$ ). While wound dehiscence was not observed in any case in binder group (0%) but in 2 (6.7%) cases in non-binder group ( $p > 0.05$ ).

In this study, at baseline, the mean FEV1 was  $77.58 \pm 22.17$  in binder group while  $79.85 \pm 16.32$  in non-binder group ( $p > 0.05$ ). After 2 weeks (15 days), the mean FEV1 was  $80.11 \pm 9.36$  in binder group while  $83.29 \pm 12.16$  in non-binder group ( $p > 0.05$ ). After 4 weeks, the mean FEV1 was  $85.36 \pm 12.34$  in binder group while  $86.66 \pm 7.89$  in non-binder group ( $p > 0.05$ ). After 6 weeks, the mean FEV1 was  $90.21 \pm 6.39$  in binder group while  $89.91 \pm 12.30$  in non-binder group ( $p > 0.05$ ). There was significant improvement in respiratory function in both groups, although binder group showed more improvement in respiratory function but the difference was insignificant.

In our trial, at baseline, the mean 6MWT was  $412.01 \pm 88.96$  m which was improved to  $559.49 \pm 52.10$  m after 6 weeks in binder group while at baseline, the mean 6MWT was  $422.30 \pm 74.59$  m which was improved to  $514.79 \pm 42.39$  m in non-binder group ( $p < 0.05$ ). A significant improvement in 6MWT was also observed in both groups, although binder group showed significantly more improvement in 6MWT. This suggests that binder use may be beneficial in facilitating early postoperative mobilization, which is considered

crucial in reducing the risk of venous thromboembolism and pulmonary morbidity.<sup>18-20</sup>

## CONCLUSION

Thus results of this study showed that abdominal binder can help to improve the physical condition as well as can well manage wound. Now in future we can recommend the abdominal binder after hernia repair in order to improve the outcome of surgery. But the study was conducted on small sample size. So further trials are also recommended to re-confirm the above reported findings.

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