

## SAFETY OF CLOSURE OF FASCIAL DEFECT DURING LAPAROSCOPIC INCISIONAL AND VENTRAL HERNIA REPAIR

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### ABSTRACT

**Background & Purpose:** Closure of the fascial disorder (CFD) techniques aim to repair the integrity, and subsequently function, of the belly wall. The underlying principle is that, by using ultimate the surgical useless space, seroma formation will lessen, cosmesis will enhance and recurrence will decrease as the belly wall muscle layer is undamaged with the rectus muscles restored to the midline role. The Aim of this work is to provide cumulative data about the safety of closure of fascial defect during laparoscopic incisional and ventral hernia. **Methods:** A systematic search was performed of PubMed, Cochrane library Ovid, Scopus & Google scholar to identify general

surgery RCTs, clinical trials, and comparative studies, which studied the outcome of closure of the fascial defect (CFD group) versus non -closure of the fascial defect (NCFD group) of

Incisional and Ventral Hernia Repair (IVH) patients. A meta-analysis was done using fixed and random-effect methods. The primary outcome of interest was the rate of adverse hernia-site outcomes. Secondary outcomes were recurrence rate and seroma formation. We calculated safety (adverse outcomes), for each group through these outcome measures.

**Results:** A total of 6 studies were identified involving 2549 patients, with 1635 patients in CFD group, and 914 patients in NCFD group. Regarding safety outcome measures, meta-analysis study showed that, there was highly significant decrease in adverse hernia-site, seroma formation and recurrence rates, in CFD group compared to NCFD group ( $p < 0.05$  respectively). **Conclusion:** To conclude, the addition of defect closure can reduce the incidence of complications and hazards after Laparoscopic Ventral Hernia Repair.

**KEYWORDS:** Closure of Fascial Defect (CFD), Ventral Hernia Repair.

## INTRODUCTION

Incisional hernia is defined as an abdominal wall defect at the site of abdominal wall closure and extra than 10% of sufferers, who go through laparotomy, experience the hernia. Ventral hernia is a bulge of tissues via an opening of weak spot within belly wall muscle tissues without surgery.<sup>[1]</sup>

Incisional/ventral hernia (IVH) is a frequent hassle of laparotomy, with a mentioned incidence of 3% to 13% of sufferers who have undergone laparotomy.<sup>[2]</sup>

The use of the laparoscopic technique to restore incisional and ventral hernias continues to gain in reputation.<sup>[3]</sup> Laparoscopic incisional and ventral hernia restore (LIVH) changed into first reported in 1993. given that that time, this procedure has persisted to be used as a way of repair of these varieties of hernias as well as different more complicated ones, which includes parastomal and parapubic hernias.<sup>[4]</sup>

Closure of the fascial disorder (CFD) techniques aim to repair the integrity, and subsequently function, of the belly wall. The underlying principle is that, by using ultimate the surgical useless space, seroma formation will lessen, cosmesis will enhance and recurrence will decrease as the belly wall muscle layer is undamaged with the rectus muscles restored to the midline role.<sup>[5]</sup>

The fascial closure methods can typically be categorized into extracorporeal or intracorporeal, and by using interrupted or running sutures. The reviewed literature described

numerous specific and informative suture techniques. The best closure method is the extracorporeal interrupted suture method.<sup>[6]</sup>

The function of number one fascial closure previous to mesh placement has these days been of interest as a further step at some point of laparoscopic ventral hernia restore. primary fascial closure of the hernia disorder attempts to recreate a purposeful, dynamic stomach wall whilst getting rid of the dead space.<sup>[7]</sup>

The maximum extensive alternate to the laparoscopic approach has been the usage of the surgical robot. This tool has allowed the surgeon to shut the defect greater without difficulty and extra effectively. moreover, it affords a platform to extra without problems carry out the preperitoneal dissection and the posterior issue separation. there was a very speedy growth of this modality within the repair of all hernias.<sup>[8]</sup>

Stomach wall hernias are common. Their surgical therapy, especially the conventional sutured repair, leads to excessive recurrence charge and frequent wound headaches.<sup>[9]</sup>

Laparoscopic incisional and ventral hernia restore (LIVHR) has been verified via massive meta-evaluation and, as some literature indicates, with superior consequences in phrases of recurrence and put up-operative worry when as compared with open surgical procedure.<sup>[10]</sup> Laparoscopic repair is advantageous than open repair including lower rates of wound infection, shorter hospital admission and less pain.<sup>[11]</sup>

**Aim of the study:** The Aim of this work is to provide cumulative data about the safety of closure of fascial defect during laparoscopic incisional and ventral hernia.

## METHODS

This review was carried out using the standard methods mentioned within the Cochrane handbook and in accordance with the (PRISMA) statement guidelines.<sup>[12]</sup>

### Identification of studies

- An initial search carried out throughout the PubMed, Cochrane library Ovid, Scopus & Google scholar using the following keywords: Closure of Fascial Defect (CFD), Ventral Hernia Repair.
- We will consider published, full text studies in English only. Moreover, no attempts were made to locate any unpublished studies nor non-English studies.

**Criteria of accepted studies**

- **Types of studies**

The review will be restricted to RCTs, clinical trials, and comparative studies, either prospective or retrospective, which studied the outcome of CFD group versus NCFD group of closure of fascial defect in IVH patients.

- **Types of participants:** Participants will be IVH patients.
- **Types of interventions:** CFD group versus NCFD group.

- **Types of Outcome Measures**

1. Rate of adverse hernia-site outcomes.
2. Rate of seroma formation.
3. Rate of recurrence.

**Inclusion criteria**

- ✓ English literature and Journal articles.
- ✓ Between 2010 until 2019.
- ✓ Describing IVH by either CFD or NCFD.
- ✓ Human studies.

**Exclusion criteria**

- ✓ Articles describing other types of surgical hernia repair.
- ✓ Irrelevance to our study.

**Methods of the review**

- **Locating studies**

Abstracts of articles identified using the above search strategy will be viewed, and articles that appear of fulfill the inclusion criteria will be retrieved in full, when there is a doubt, a second reviewer will assess the article and consensus will be reached.

- **Data extraction**

Using the following keywords: Closure of Fascial Defect (CFD), Ventral Hernia Repair, data will be independently extracted by two reviewers and cross-checked.

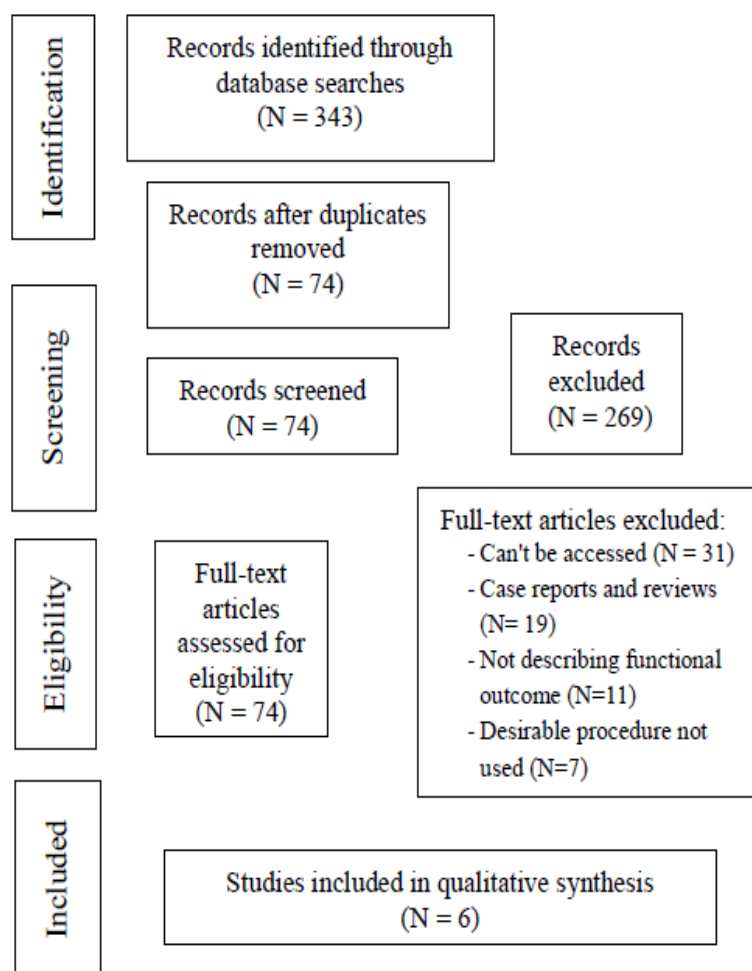
**Statistical analysis**

Statistical analysis done using MedCalc ver. 18.11.3 (MedCalc, Ostend, Belgium). Data were

pooled and risk ratios (RRs) as well as standard mean differences (SMD), were calculated with their 95 per cent confidence intervals (CI). A meta-analysis was performed to calculate direct estimates of each treatment, technique or outcome. According to heterogeneity across trials using the  $I^2$ -statistics; a fixed-effect model ( $P \geq 0.1$ ) or random-effects model ( $P < 0.1$ ) was used.

### Study Selection

We found 343 record; of them 74 unique records identified (duplicate removed) by the database searches; 269 were excluded based on title and abstract review; 74 article are searched for eligibility by full text review; 31 articles cannot be accessed or obtain full text; 19 studies were reviews and case reports; 11 were not describing functional outcome; the desired procedure not used in 7 studies leaving 6 studies that met all inclusion criteria (Fig. 1).



**Figure 1: Flow chart for study selection.**

## RESULTS

## Descriptive analysis of all studies included (Table 1, 2)

Table 1: Patients and Study Characteristics.

N	Author	Type of study	Number of patients			Age (average years)	Follow up time (average months)
			Total	CFD Group	NCFD Group		
1	Sharma <i>et al.</i> , 2010	Retrospective	75	17	58	NM	52
2	Clapp <i>et al.</i> , 2013	Retrospective	176	36	140	NM	24
3	Zeichen <i>et al.</i> , 2013	Retrospective	128	35	93	63.3	31
4	Chelala <i>et al.</i> , 2016	Retrospective	1326	1294	32	52.2	32.6
5	Martin-del-Campo <i>et al.</i> , 2018	Retrospective	783	222	561	55	NM
6	Elwan and Eid, 2019	Retrospective	61	31	30	44.1	NM

#Studies were arranged according to publication year. NM: not mentioned.

Table 2: Summary of Safety Outcome Measures in All Studies.

N	Author	Safety outcomes					
		Rate of adverse hernia-site outcomes		Rate of seroma formation		Rate of recurrence	
		CFD group	NCFD group	CFD group	NCFD group	CFD group	NCFD group
1	Sharma <i>et al.</i> , 2010	0	14	0	8	0	3
2	Clapp <i>et al.</i> , 2013	2	14	2	10	0	16
3	Zeichen <i>et al.</i> , 2013	3	25	4	4	6	19
4	Chelala <i>et al.</i> , 2016	52	32	25	9	2	63
5	Martin-del-Campo <i>et al.</i> , 2018	8	84	1	65	12	80
6	Elwan and Eid, 2019	17	34	5	11	1	4

The included studies published between 2010 and 2019. Regarding the type of included studies, all studies were retrospective.

The total number of patients in all the included studies was 2549 patients, with 1635 patients in CFD group, and 914 patients in NCFD group, while their average follow up time was (34.9 months).

The average age of all patients was (53.6 years); with youngest mean age of 44.1 years in *Elwan and Eid, 2019* study; and oldest mean age of 63.3 years in *Zeichen et al., 2013* study.

## Outcome measures (Fig. 2, 3, 4)

Regarding safety outcomes, all 6 studies reported adverse hernia-site outcomes, seroma formation and recurrence rate.

### Meta-Analysis of Outcome Measures

Data were divided into two groups:

- 1) CFD group
- 2) NCFD group

Meta-analysis study was done on 6 studies which described and compared the 2 different techniques for IVH; with overall number of patients (N=2549).

### (B) Safety

Patients who reached serious adverse events (SAEs) – were pooled to evaluate safety by:

*Safety of a specific technique was measured by*

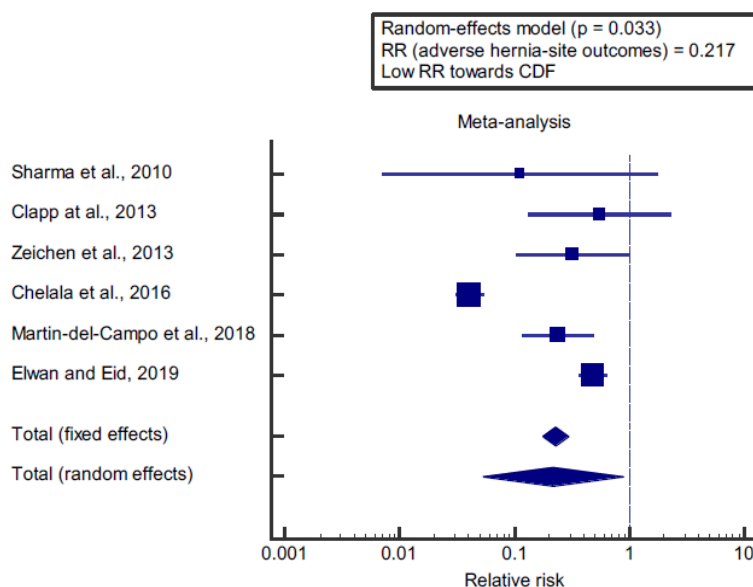
#### ✓ Relative Risk or Risk Ratio (RR)

- For rate of adverse hernia-site outcomes.
- For rate of seroma formation.
- For rate of recurrence.

Regarding rate of adverse hernia-site outcomes (Fig. 2),

Random-effects model was chosen to assess efficacy; with overall RR= 0.217.

Meta-analysis study showed that; random-effects model showed highly significant decrease in adverse hernia-site outcomes in CFD group compared to NCFD group ( $p = 0.03$ ).

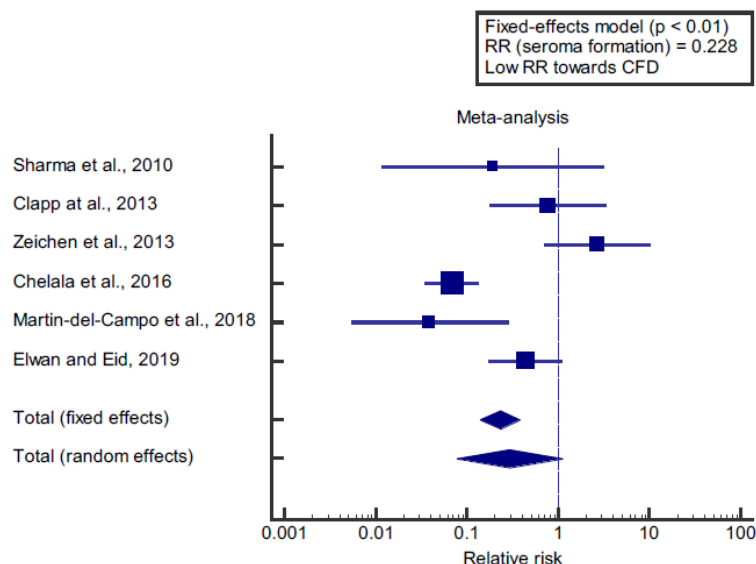


**Figure 2: Forest plot of (adverse hernia-site outcomes) on CFD group vs NCFD group – Risk Ratio.**

Regarding rate of seroma formation (Fig. 3),

Fixed-effects model was chosen to assess efficacy; with overall RR= 0.228.

Meta-analysis study showed that; fixed-effects model showed highly significant decrease in seroma formation in CFD group compared to NCFD group ( $p < 0.01$ ).

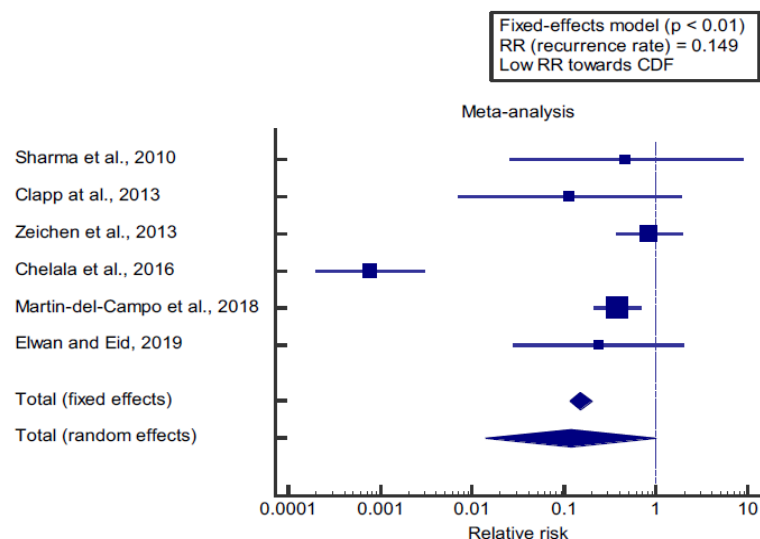


**Figure 3: Forest plot of (seroma formation) on CFD group vs NCFD group – Risk Ratio.**

Regarding rate of recurrence (Fig. 4),

Fixed-effects model was chosen to assess efficacy; with overall RR= 0.149.

Meta-analysis study showed that; fixed-effects model showed highly significant decrease in recurrence rate in CFD group compared to NCFD group ( $p < 0.01$ ).



**Figure 4: Forest plot of (recurrence) on CFD group vs NCFD group – Risk Ratio.**



## DISCUSSION

The included studies published between 2010 and 2019. Regarding the type of included studies, all studies were retrospective.

The total number of patients in all the included studies was 2549 patients, with 1635 patients in CFD group, and 914 patients in NCFD group, while their average follow up time was (34.9 months) which came in disagreement with *Martin-del-Campo et al. 2018*.<sup>[13]</sup>

*Martin-del-Campo et al. 2018* reported that the mean follow-up time was 12.1 months.

The average age of all patients was (53.6 years); with youngest mean age of 44.1 years in *Elwan and Eid, 2019* study; and oldest mean age of 63.3 years in *Zeichen et al., 2013* study.

As regard follow up time and average age of all patients results came in agreement with *Liot et al. 2017*.<sup>[14]</sup>

*Liot et al. 2017* reported that Mean follow-up was  $49 \pm 12.6$  months. Mean age at the time of surgery was 60 years (range, 28–83).

**About Outcome measures:** Regarding safety outcomes, all 6 studies reported adverse hernia-site outcomes, seroma formation and recurrence rate.

Data were divided into two groups (**CFD group** and **NCFD group**): Meta-analysis study was done on 6 studies which described and compared the 2 different techniques for IVH; with overall number of patients (N=2549).

Patients who reached serious adverse events (SAEs) – were pooled to evaluate safety by: Safety of a specific technique was measured by: Relative Risk or Risk Ratio (RR); (For rate of adverse hernia-site outcomes, For rate of seroma formation and for rate of recurrence).

Regarding rate of adverse hernia-site outcomes; Random-effects model was chosen to assess efficacy; with overall RR= 0.217.

Meta-analysis study showed that; random-effects model showed highly significant decrease in adverse hernia-site outcomes in CFD group compared to NCFD group ( $p = 0.03$ ) which came in disagreement with *Zeichen et al. 2013*<sup>[15]</sup>, and *Clapp et al. 2013*.<sup>[16]</sup>

*Zeichen et al. 2013* reported that 128 sufferers were studied: 93 sufferers (72.66 %) inside

the non- closure institution and 35 sufferers (27.34 %) inside the closure organization. observe-up was to be had in one zero five sufferers (82.03 %) at an average of 797.2 days (range 7–three, 286 days). inside the non- closure institution there have been 14 sufferers (15.05 %) with postoperative complications and eight sufferers (22.86 %) within the closure institution.

**Clapp *et al.* 2013** reported that rate of all complications in CFD group was 12 (33.3%) while in NCFD group was 19 (52.8%) without statistical significance.

Regarding rate of seroma formation; Fixed-effects model was chosen to assess efficacy; with overall RR= 0.228.

Meta-analysis study showed that; fixed-effects model showed highly significant decrease in seroma formation in CFD group compared to NCFD group ( $p < 0.01$ ) which came in agreement with **Tandon *et al.* 2016<sup>[5]</sup>**, and in disagreement with **Papageorge *et al.* 2017.<sup>[17]</sup>**

**Tandon *et al.* 2016** reported that CFD resulted in a significantly lower rate of seroma (2.5 per cent (39 of 1546) versus 12.2 per cent (47 of 385)), with a combined RR of 0.37 (0.23 to 0.57;  $P < 0.001$ ), and shorter duration of hospital stay.

**Papageorge *et al.* 2017** reported that in addition, on multivariable evaluation, percent had no massive impact on the hazard of seroma formation (OR 0.87, 95% CI 0.58–1.31).

Regarding rate of recurrence; Fixed-effects model was chosen to assess efficacy; with overall RR= 0.149.

Meta-analysis study showed that; fixed-effects model showed highly significant decrease in recurrence rate in CFD group compared to NCFD group ( $p < 0.01$ ) which came in agreement with **Martin- del-Campo *et al.* 2018** and in disagreement with **(Gonzalez *et al.* 2015.<sup>[18]</sup>**

**Martin-del-Campo *et al.* 2018** reported that Objectively confirmed recurrences were additionally appreciably lower within the DC institution (5.4 vs 14.2%,  $p=0.003$ ).

**Gonzalez *et al.* 2015** reported that recurrence rate in non-primary closure of the defect was 5 (7.5%) while in primary closure of the defect was 1 (1.5%) without statistical significance ( $p$  value= 0.095).

## CONCLUSION

To conclude, the addition of defect closure can reduce the incidence of complications and hazards after Laparoscopic Ventral Hernia Repair.

## ACKNOWLEDGMENTS

### Conflict of interest

None.

### Authorship

All the listed authors contributed significantly to conception and design of study, acquisition, analysis and interpretation of data and drafting of manuscript, to justify authorship.

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