

## Open Incisional Hernia Repair with component separation

Dr. Pranav Raja Yadav, Dr. Brijesh Sharma, Dr. Sanjay Singhal

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### Abstract

Large and complex defects of the anterior abdominal wall occur commonly due to herniation following abdominal surgery, but may also be caused by other causes like trauma, infection, or tumor resection. Besides the obvious aesthetic disfigurement, large abdominal wall defects can also lead to functional consequences with poor protection of the intra-abdominal viscera. The management of such defects poses a surgical challenge, particularly since primary repair has reported recurrence rate as high as 50%.

Large complex and recurrent abdominal wall defects are particularly challenging to a surgeon.

Various methods of hernia repair have been used which either open or laparoscopic can be used to manage abdominal wall defects.

However, wide hernia defects are difficult to correct because

Primary hernia repair will mostly result in wound tension which is a major cause of repair failure and recurrence.

The use of synthetic mesh decreases recurrence rates by up to 20%.

On the other hand, the use of synthetic mesh carries the risk of life-long foreign body reaction and possible serious complications such as mesh infection, exposure, extrusion and fistulae.

Furthermore, synthetic materials are also contraindicated in the presence of gross contamination or infection in the operative field.

The Component Separation Technique (CST) was first described by Ramirez et al in 1990. It is very effective for reconstructing large or complex midline abdominal wall defects and it has the advantage of restoring the innervated dynamic abdominal wall integrity without producing undue tension on the repair.

In 1990, Ramirez and colleagues originally described techniques of medial fascial advancement to aid in definitive reconstruction. In their component separation, Ramirez and colleagues first released the posterior rectus sheath. In 30% of their patients, this was not enough to permit midline closure, and they therefore created large skin flaps to expose and release the external oblique muscle.

Recurrence rates after such component separation Hernia repairs range from 10% to 22%, with mean follow-up periods of 9.5 months to 4.5 years. It can be performed to reconstruct a large abdominal wall defect Without the need for mesh.

Recurrence rates after the use of component separation technique Ranged from 0% to 30%. Laparoscopic-assisted CST was performed to save the perforators of the epigastric arteries and the results were comparable to the open technique.

Despite the versatility of the CST and its low recurrence rates compared to the recurrence rate in the conventional repair of similar complex abdominal wall defects, the technique is still not popular in the general surgical practice.

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### I. Introduction

Despite the relatively high incidence of incisional hernia, no consensus has been reached on the best method of closure of abdominal wall. [1-4]

Primary suture based repair is associated with a high incidence of recurrence rate. The utilization of mesh for hernia repair has substantially improved recurrence rates.[1-4]

Laparoscopic hernia repair are associated with low recurrence rate but is not feasible in all patients' population, particularly those with loss of abdominal domain, infection on abdominal contamination.

Repair of large ventral hernia is a challenge for even experienced surgeons, as there are large defects with large contents, often with loss of domain.

The large defects were bridged by various procedures like myofascial flaps or free flaps which are associated with high recurrence rates and complications. More often, the bridging was done with artificial prosthesis,

leaving the defects open. This was accomplished by either open surgery (on lay, inlay, sub lay or underlay) or laparoscopic intra-peritoneal on lay meshes (IPOMs). [5-8]

However, by not closing the midline incision there are many adverse effects on postural maintenance, respiration, micturition, defecation and biomechanical properties involving the abdomen, which have a profound impact on the patients' overall physique and quality of life.

Component separation technique (CST) is a novel Technique for the closure of midline with live, active tissues with or without the use of additional prosthesis like mesh.

Component separation technique allows for autologous tissue transfer, approximation of the Rectus abdominis muscle complex, and closure of the linea Alba following bilateral release of the external oblique Apo neurosis and posterior rectus sheath.[7-8]

Recurrence rate with this technique have been reported as low as 18%.[7]While CST was described without the additional utilization of bio-prosthetic meshes are frequently used an adjunctive reinforcement to ventral hernia repair.

The component separation technique restores functional as well as structural integrity of the abdominal wall, provides stable and enough soft tissue coverage, and also optimizes aesthetic appearance. Component Separation Technique involves dissection of skin and subcutaneous fat until they are free from the anterior sheath of the rectus abdominis muscle and the aponeurosis of the external abdominal oblique muscle. The external abdominal oblique is incised 1 to 2 cm lateral to the rectus abdominis muscle. The external abdominal oblique is separated from the internal abdominal oblique. The dissection is carried to the posterior axillary line. Additional length can be achieved by incising the posterior rectus sheath above the arcuate line. , Care must be taken to avoid damaging the nerves and blood supply that enter the rectus abdominis posteriorly. (From de Vries Reilingh TS, van Goor H, Rosman C, et al: Components separation technique for the repair of large abdominal wall hernias. J Am Coll Surg 196:32–37, 2003.)

The purpose of the study was to investigate advantage, disadvantage and recurrence rate and complication of CST in large incisional hernia repair.

## **II. Methods**

The study was conducted in the Department of Surgery, Mahatma Gandhi Medical College and Hospital, Jaipur, India. It was undertaken from January 2018 to July 2019. The study proposal was prepared and presented to the Institutional Ethical Committee who approved the project. All the participants in the study were explained clearly about the purpose and the nature of the study in language best understood by them. They were enrolled only after obtaining a written and informed consent.

**STUDY DESIGN:** A Case Study

**STUDY POPULATION:** Patients admitted under general surgery in accordance with inclusion and exclusion criteria and who underwent Ventral incisional hernia repair with anterior component separation.

Study sample:

A total of 50 patients were selected as per inclusion criteria and exclusion criteria

● **INCLUSION CRITERIA :**

- Both males and females, between 20 and 65 years old. The patient has a diagnosis of Incisional hernia by imaging and clinical examination
- Any patient suffering from primary or recurrent incisional hernia
- The patient or patient's legal representative has been informed of the nature of the study, agrees to its provisions and has provided written informed consent.

**Exclusion criteria**

- Any patient with active wound infection and sinus.
- Any patient who has had hernial defect less than 4 cm.

**Preoperative measures**

All variables like demographics, Co-existing morbidities, indication of repair, and history of previous repairs were noted . All routine blood investigation are performed.

**INTRA OPERATIVE MEASURES:**

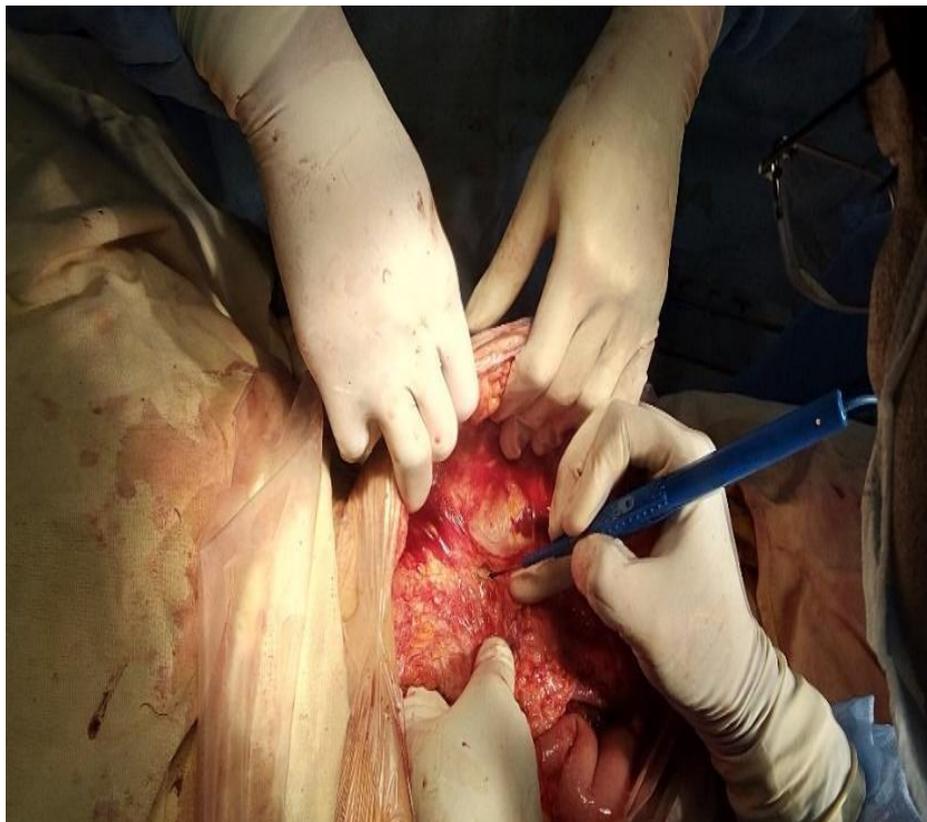
The Patients were kept supine and abdominal access was obtained via midline incision. After entering the abdominal cavity, the bowels were dissected from the ventral abdominal wall if any previous adhesions were present



Removing intra bowel adhesions.  
(figure-1)

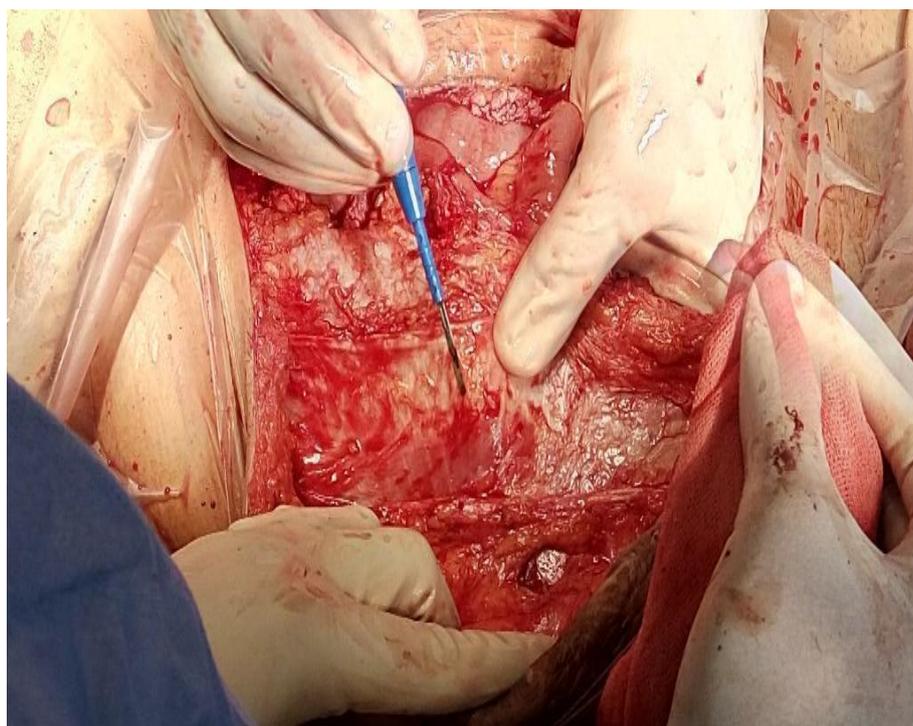
Skin along with subcutaneous fat and tissue were dissected free from the anterior sheath of rectus abdominis along with the aponeurosis of the external oblique muscle.

After Forming Subcutaneous Flaps and identifying the fascia medial to the rectus , lipo-cutaneous flaps were created by dissecting the subcutaneous tissues off the anterior rectus sheath



Formation of lipo-cutaneous flap  
(Figure-2)

The external oblique aponeurosis is transected longitudinally about 2 cm lateral from the rectus sheath, including the muscular part on the thoracic wall, which extend at least 5 to 7 cm cranially of the costal margin.

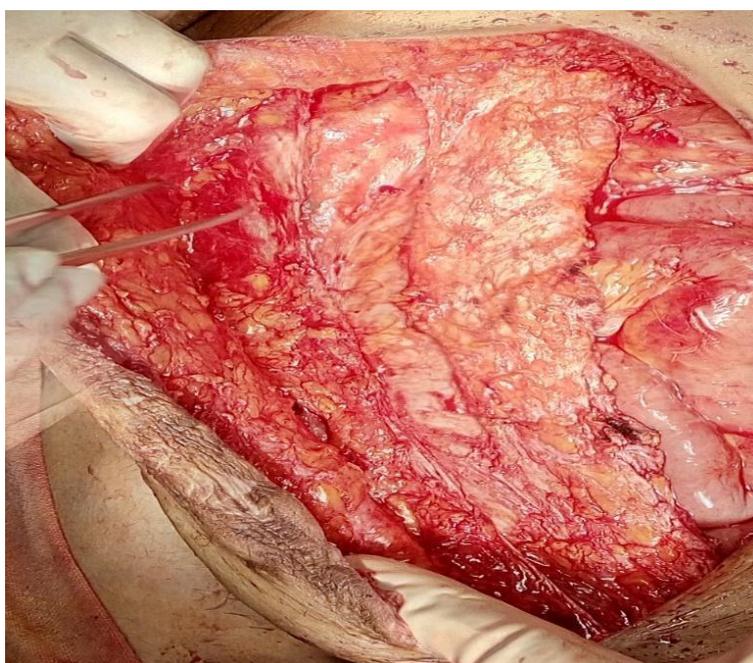


Separation of external oblique aponeurosis  
(Figure-3)

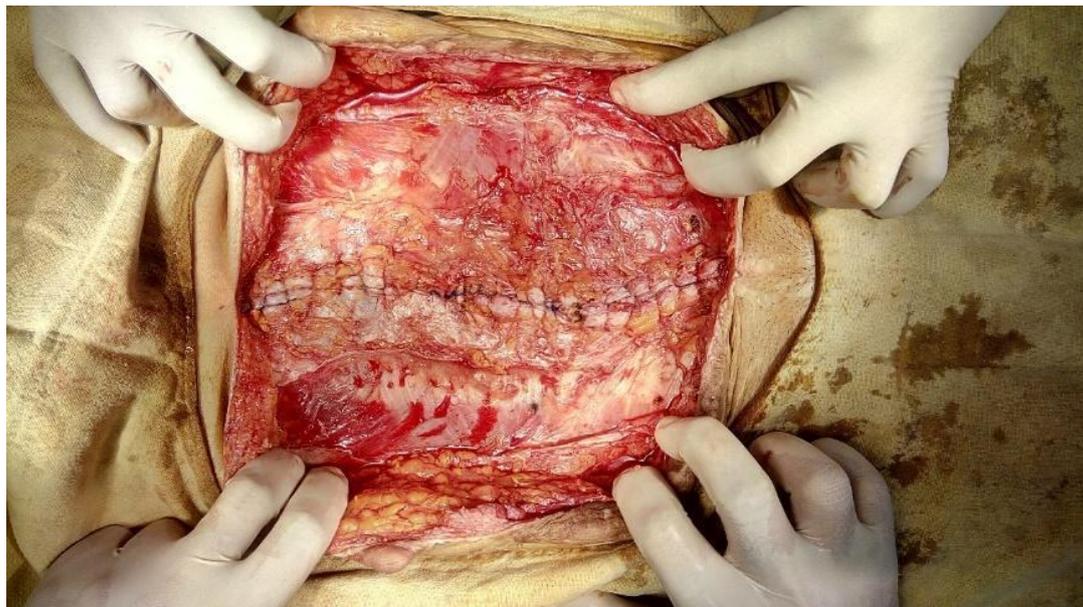


Separated external oblique and rectus abdominis  
(Figure-4)

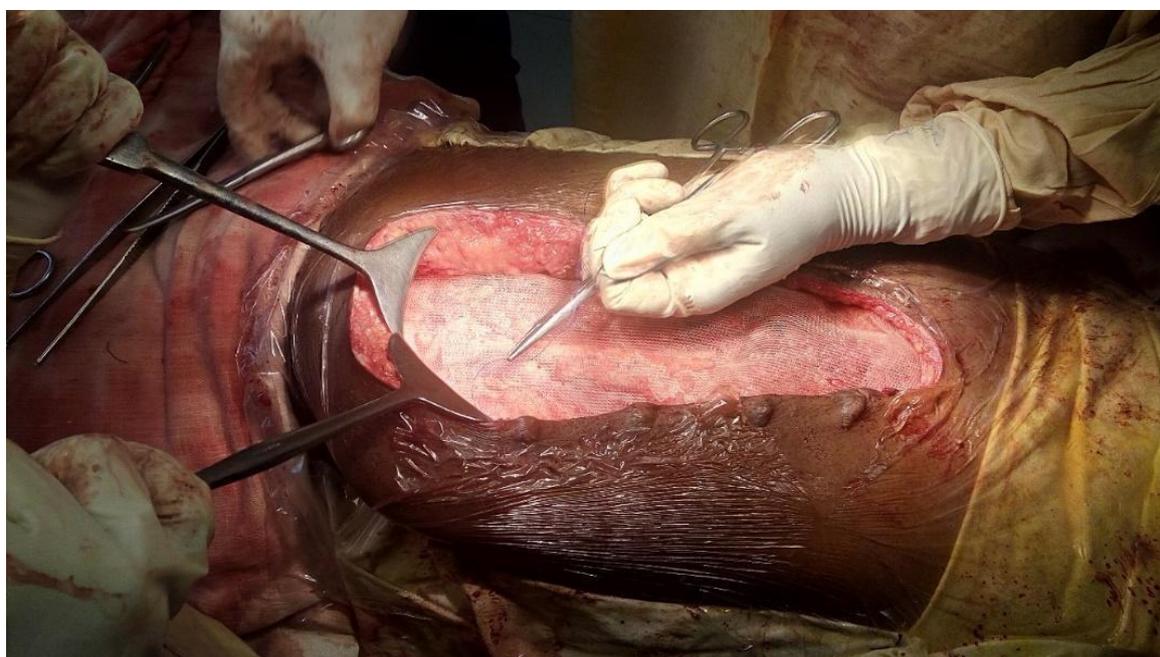
If primary closure is impossible with undue tension, a further more gain of 2 to 4 cm can be reached by separation of the posterior rectus sheath from the rectus abdominis muscle.



Separated external oblique and rectus abdominis  
(Figure-5)



Easy approximation and Closure of anterior abdominal wall with both side separation of component  
(Figure-6)



Prosthetic mesh placements (propene mesh)  
(Figure-7)

We have used prolene mesh 30x30 cm sized mesh in every case.



Skin closure with drain placed in situ

Care must be taken not to damage the blood supply and nerves that run between the internal oblique and transverse abdominis.





III. Results

A prospective study of 50 patients was done from January 2018 to July 2019 at Department of General Surgery, Mahatma Gandhi Medical College and Hospital, Jaipur.

All the patients who had undergone component separation technique for large ventral incisional hernia repair in this study.

Various patients were observed and recorded and followed-up during our study such as to determine the early and late results of the technique like Wound infection, Re-herniation, Hospital stay, Seroma Formation, Quality-of-life using Standardized tools index

TABLE 1. Wound Infection

	Number of Cases	Percentage
Yes	3	6.00
No	47	94.00
Total	50	100.00

- In this study, only six percent of cases reported wound infection
- Majority of the patients did not have any infection after 5 days of antibiotic therapy



TABLE: 2 Re herniation

	Number of Cases	Percentage
Yes	4	8.00
No	46	92.00
Total	50	100.00

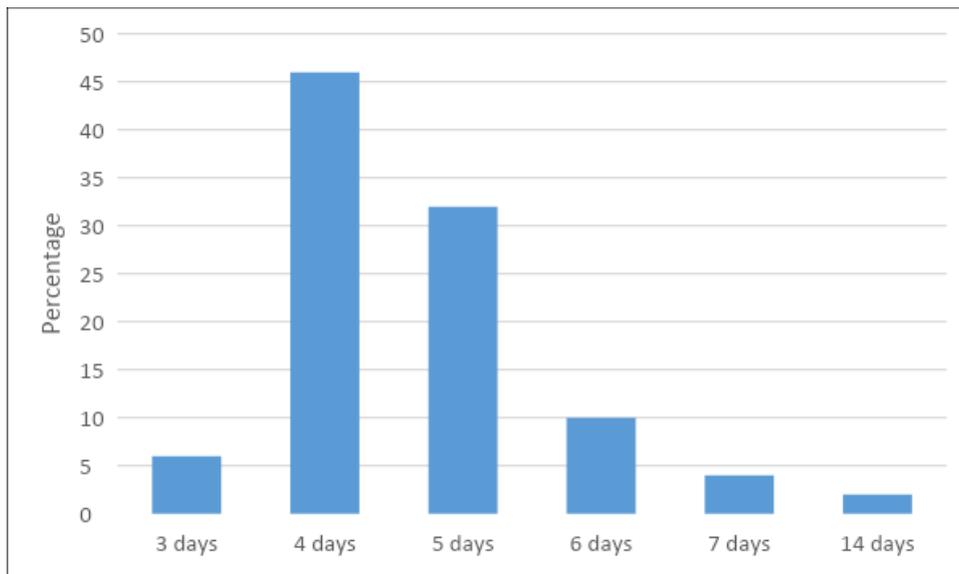


In this study eight (8) percent % of all patients had regeneration and 92 percent went uneventful recovery

Table 3 Hospital Stay

Hospital Stay

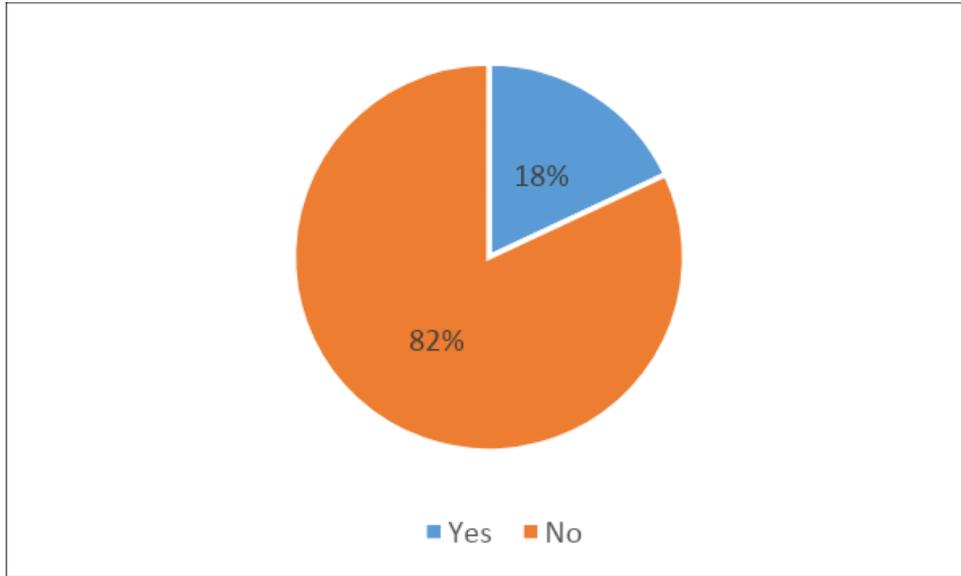
	Number of Cases	Percentage
3 days	3	6.00
4 days	23	46.00
5 days	16	32.00
6 days	5	10.00
7 days	2	4.00
14 days	1	2.00
Total	50	100.00



Maximum Patients had a short hospital with maximum patients being discharged on 4th day of hospital admission . Only Patient with wound infection had be admitted for 2 weeks

Table 4 Seroma formation

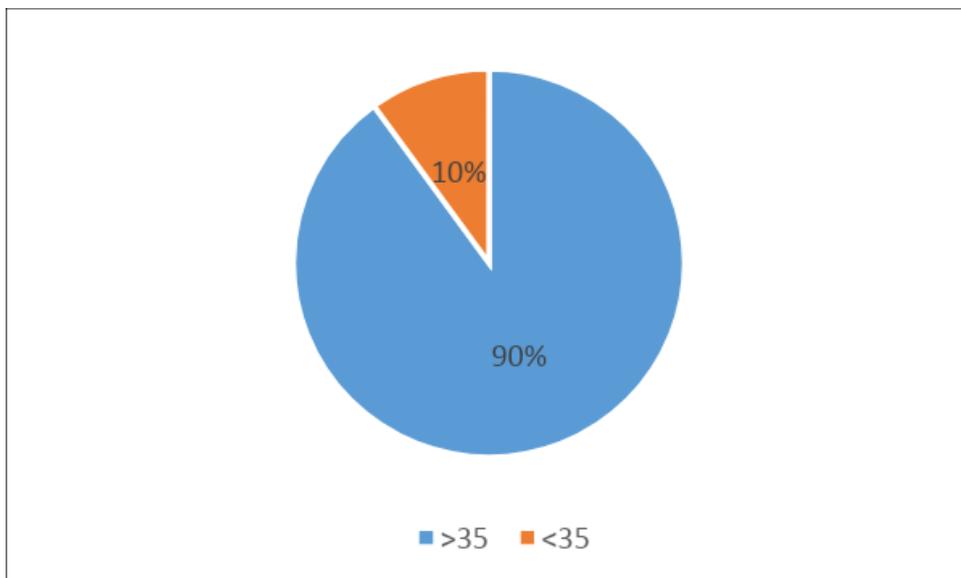
	Number of Cases	Percentage
Yes	9	18.00
No	41	82.00
Total	50	100.00



Seroma formation was the most common post operative complication in this study with approx 18 percent ( 9 patients ) having reported this.

Table 5 Quality of Life  
Quality of life

	Number of Cases	Percentage
>35	45	90.00
<35	5	10.00
Total	50	100.00



- Quality of life is the most important factor as it comprises both physical and mental well being most of our patients (90%) had a score of >35 i.e. they were satisfied with their quality of life post surgery

#### IV. Conclusion

This study reviewed 50 patients who underwent ventral Incisional hernia repair with Component separation technique from January 2018 to July 2019.

This study evaluated the outcome of each case and also identified the effectiveness of component separation technique in treating large and complex incisional hernia.

Here we discuss the parameters we had evaluated in this study like the post-operative complication in terms of Wound infection, Re-herniation, Hospital stay, Seroma Formation, Quality-of-life Age Distribution

Variables	Present study	de Vries Reilingh et al	Nockolds et al
Age	23.6	49.7	57

- In the study conducted by De Vries Reilingh et al the average age was 49.7.
- In present study the average age was 23.66
- In study conducted by Nockolds et al average age was 57 year.

##### 1. Gender Distribution

Gender of patients	Present study	De Vries Reilingh et al	Nockolds et al
Male	14(28 %)	32(74.5%)	15(65.3%)
Female	36(72%)	11(25.5%)	8(34.7%)

- As shown in the above table, the study conducted by De Vries Reilingh et al had 74.5% male patients and 25.5 % female patients.
- In this study, male predominated the picture with ratio of 3:1.
- There were 72% female patients and 28% male patients in present study.
- In study conducted by Nockolds et al male to female ratio was 15:8 having male pre-ponderance.
- In present study female pre-ponderous was there with values were not similar in both study.
- The female predominance may be due to female has undergone multiple deliveries and more lax abdominal wall and also had undergone abdominal surgery.

##### 1. Duration of hospital stay

Variables	Present study	De Vries Reilingh et al	Nockolds et al
Duration of hospital stay	3 days	15 days	12 days

- In study conducted by Nockolds et al average stay in hospital post-operatively was 12 days.
- In study conducted by De Vries Reilingh et al average days of stay was 15 days.
- In present study average days of hospital stay was 3 days.
- Out of 50 patients 13 patients were discharged within 4 days where as 36 patients were discharged within 7 days.
- One patient was discharged after 14 days.
- One patient had stayed about 14 days with multiple operative procedure done. This male patient got wound infection on 4th post-operative day. Then daily dressing was done for that and then after patient underwent debridement and then after she had under gone skin grafting. After that he was discharged on 14th day post operatively.
- In our study hernia repair was done with component separation technique where large subcutaneous flaps were created, so patients were at a higher risk of seroma or hematoma formation, for that negative drain inserted and monitored daily. Patients were discharged with drain in situ to prevent hospital acquired infection and risking of failure of hernia repair

##### 2. Post-operative Complications

Variables	Present study	De Vries Reilingh et al	Nockolds et al
Wound infection	3(6%)	6(13.9%)	1(4.3%)
Re herniation	1(2%)	1(2.3%)	1(4.3%)
Seroma formation	7(14%)	2(4.7%)	1(4.3%)

● Wound infection is the most common complication amongst the mentioned complications. It is also multifactorial as its occurrence was more reported in diabetic patients. In study conducted by De Vries Reilingh et al around 13.9% of the patients had reported with wound infection. It had 6 patients with infection out of 43 patients.

In study conducted by Nockolds et al 6 patients with large incisional hernia were treated with anterior component separation technique and out of 6 patients only one patient had reported with wound infection. It had very much low incidence of infection as only 4.3% count for it as compared to mentioned both study in above table.

In present study 6% of the patients had reported with wound infection. Only 3 patients had this complication. And majority of the who had got the complication were diabetic.

● In present study out of 1 patient had reported with re herniation in 6 month of follow-up period.

In study conducted by De Vries Reilingh et al around 2.3% patient re herniation. Where as in study of Nockolds et al 4.3% of patient had reherniation.

● As we are creating large space in anterior component separation between skin flap and sheath there are more chances of having seroma formation.

As mentioned in above table in present study 7(14%) patient out of 50 had developed seroma formation within 6 month of period. And treated conservatively with antibiotic cover which subsided gradually with time.

In study conducted by Nockolds et al 4.3% patients had reported with seroma formation.

In study conducted by De Vries Reilingh et al 2 (4.3%) patients had developed seroma formation.

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