

## Desarda's No Mesh Repair versus Open Preperitoneal Mesh Repair for Inguinal Hernia: A Comparative Study

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### ABSTRACT

#### BACKGROUND

This study was conducted to assess and compare the efficacy of Desarda's no mesh repair over open preperitoneal mesh repair for the treatment of inguinal hernia, compare the complications associated with both the modalities of treatment, and decide on the better treatment for inguinal hernia based on the findings of the study.

#### METHODS

This was a hospital based single-centre, single-blind, prospective, comparative and randomized study conducted among 71 patients who presented with inguinal hernia in M.K.C.G. Medical College and Hospital, Berhampur over a period of two years from August 2020 to July 2022 after obtaining clearance from the institutional ethics committee and written informed consent from the study participants.

#### RESULTS

Duration of surgery, post-operative groin pain, surgical site infection, seroma/haematoma, scrotal oedema, foreign body sensation, duration of hospital stay, and recurrence were significantly ( $p < 0.05$ ) less in the case of Desarda's no-mesh repair than open preperitoneal mesh repair. Return to normal activity is earlier in the case of Desarda's no-mesh repair.

#### CONCLUSION

Desarda's no-mesh repair is easy to learn, simple and takes less time to perform, it is also cost-effective. Desarda's repair is superior to open preperitoneal mesh repair in terms of

postoperative pain, return to normal activity, and no foreign body sensation. Desarda's repair is superior to the mesh-based technique in terms of outcome.

**KEYWORDS:** Desarda's No Mesh Repair, Open Preperitoneal Mesh Repair, Inguinal Hernia.

## INTRODUCTION

The word "hernia" is derived from a Latin term meaning "a rupture."<sup>[1]</sup> A hernia is defined as a protrusion of a whole or a part of a viscus through the wall that contains it.<sup>[2]</sup> It has the highest incidence in most parts of the world in the outpatient department. The incidence and prevalence of inguinal hernia are not accurately known. 27% of men and 3% of women have the chance of undergoing an inguinal hernia operation during their lives, which is quite high.<sup>[3]</sup> The first technique for inguinal hernias repair was developed by Bassini in 1887, and since then, several methods and operations have been developed. Techniques like tissue repairs such as modified Bassini, Shouldice, Nylon–Darn, Halsted–Tanner, and Mc Vay and the free of tension repair with mesh to laparoscopic hernia repair have a wider range of applications. Hernia repair has become an increasingly complicated technique not only due to the establishment of laparoscopic surgery but also the development of traditional open techniques over the last 20 years.<sup>[4]</sup> Lichtenstein mesh repair [LT] has been considered a standard and safe procedure for the surgical repair of inguinal hernias. The use of mesh as a mechanical barrier reduces the physiological mobility of the posterior wall, which acts as a limitation of mesh hernioplasty.<sup>[5]</sup> Recent studies have shown that mesh hernioplasty has more complications. The complications include foreign body sensation, local reactions (meshoma) as well as discomfort and abdominal wall stiffness, which can affect the quality of life of the patient.<sup>[6-7]</sup> To find the best way to repair inguinal hernias, it is important to address issues like recurrences and especially chronic pain. New randomized clinical studies are still being conducted to find out the best technique.<sup>[8-10]</sup> To remove the drawbacks of mesh repair, the DT (Desarda Technique) has emerged as a promising non-mesh tissue repair. Prof. M.P. Desarda introduced DT to minimise mesh complications and remove tension from the posterior wall of the inguinal canal by adding more strength and dynamic to it. He is the pioneer of this simple technique. The sutures lines are tension-free and no synthetic foreign-body materials are used, as used in mesh repairs; these are the advantages of DT. The technique is adopted because it is simple, easy to learn and easy to perform. The mobility and dynamic nature of the posterior inguinal wall are not compromised as the degree of fibrosis is decreased to minimum. Weak abdominal wall muscles or transversalis fascia are not used for repair in this technique. It has been reported by several authors that DT is superior to other inguinal hernia repair techniques.<sup>[7]</sup>

Improvements in surgical technique and a better understanding of the anatomy and physiology of the inguinal canal have significantly improved outcomes for many patients.<sup>[11]</sup> The choice of a method depends on the surgeon; however, the ideal method for modern hernia surgery should be simple, cost-effective, safe, tension-free, and permanent.<sup>[12]</sup> No surgeon has ideal results despite the various modalities available for the treatment of this common condition. The challenge to surgeons is caused mostly by post-operative complications like pain, nerve injury, infection, and recurrence. This necessitates the introduction of a new technique of hernia repair with reduced complication rates.<sup>[12]</sup>

## MATERIALS & METHODS

This was a hospital-based single-centre, single-blind, prospective, comparative and randomized study conducted among 71 patients who presented with inguinal hernia in M.K.C.G. Medical College and Hospital, Berhampur over a period of two years from August

2020 to July 2022 after obtaining clearance from the institutional ethics committee and written informed consent from the study participants.

## **Inclusion Criteria**

- All patients presenting with unilateral inguinal hernia.
- All patients aged 18 and above.

## **Exclusion Criteria**

- All the patients presenting with complicated hernias, undergoing emergency hernia surgeries.
- Patients who are unfit for surgery.
- Associated surgical pathologies where the patient was getting operated on for both conditions at the same time, laparoscopic repairs, or the patient was given general anaesthesia for any reason.
- Old age with thinned-out external oblique aponeurosis.
- Pregnancy.
- Children.
- Morbid obesity.
- Bilateral/ recurrent/ complicated inguinal hernia.

## **Collection of Data**

The material for the study was taken from the cases attending the General Surgery OPD of all the units of the Department of General Surgery, MKCG Medical College and Hospital, Berhampur who were diagnosed to have an inguinal hernia (direct, indirect or pantaloon inguinal hernia). The patients were subjected to a detailed clinical history and physical examination to confirm the diagnosis and rule out other systemic diseases. This was a prospective randomized comparative study involving two groups. Patients were randomly subjected to Open preperitoneal mesh repair and Desarda's no mesh technique after obtaining informed consent. All patients were treated with antibiotics and analgesics postoperatively. The follow-up of these patients was done with a history regarding symptoms of postoperative complications like pain, surgical site infection, scrotal edema, etc.

## **Sample Size**

Among the 71 cases who were diagnosed with inguinal hernia, they were divided into two groups.

Group I: 35 patients were subjected to Desarda's no-mesh repair.

Group II: 36 patients were subjected to open preperitoneal mesh repair.

## **Intra-Operative Parameters** <sup>[13]</sup>

1. Type of anaesthesia
2. Duration of surgery

## **Post-Operative Parameters**

1. Groin pain: Pain was measured using a visual analogue scale (VAS), which ranges from 0 (No pain); 2 (mild, annoying pain); 4 (nagging, uncomfortable, troublesome pain); 6 (distressing, miserable pain); and 10 (Maximum, unbearable pain).

2. Surgical site infection
3. Foreign body sensation
4. Loss of sensation over the groin
5. Scrotal oedema / testicular sensation
6. Seroma / hematoma
7. Duration of hospital stay
8. Return to normal activity
9. Recurrence

## **Desarda's No Mesh Repair**

The concept of providing a strong, mobile and physiologically active posterior abdominal wall is the basis of this new technique. Dr. Mohan P. Desarda coined this technique at Poona Hospital and Research Centre, Pune.

## **Procedures<sup>[14]</sup>**

The external oblique aponeurosis (EOA) is cut, and the inguinal canal is opened. Sac and cord separation is done as usual. The medial leaf of the EOA and inguinal ligament are sutured with suture from the pubic tubercle to the deep ring. Cautions should be maintained not to constrict cord structures during narrowing the deep inguinal ring by suturing the medial leaf of the EOA to the inguinal ligament. A splitting incision is made 1.5- 2 cm above and parallel to the suture line in the medial leaf and is extended medially up to the rectus sheath and laterally 1- 2 cm beyond the deep ring. The medial insertion and lateral continuation of this strip are kept intact, through which it gets its blood supply. The upper free border of the strip is sutured to the conjoint tendon with 2/0 polypropylene interrupted sutures. The strip of EOA is placed behind the cord to form a new posterior wall of the inguinal canal. The lateral leaf of the EOA is sutured to the newly formed medial leaf of the EOA in front of the cord. Undermining of the newly formed medial leaf on both of its surfaces helps in approximation to the lateral leaf without tension. This is followed by the closure of the superficial fascia and the skin as usual.

## **Mechanism of Action<sup>[15]</sup>**

External oblique muscle contraction produces a lateral tension in the strip, whereas internal oblique or conjoined muscle contraction results in a superolateral tension, hence making the strip like a shield which prevents herniation. Hence, when there is a strong intra-abdominal blow, there is a strong intra-abdominal contraction. This gets translated into increased tension in the external oblique aponeurosis strip which protects from herniation. Advantages include no suture line tension, no foreign material, and being simple and easy to do and learn.

## **Open Preperitoneal Mesh Repair**

In Open or TIPP (Trans-Inguinal Pre-Peritoneal) mesh repair, 1 cm above the deep ring incision was given and deepened to reach the fascia of Camper and Scarpa.

It was further deepened to reach the external oblique aponeurosis, which was incised along the line of fibres. The internal oblique muscle was split, followed by the transversalis fascia, to reach the pre-peritoneal space. The inferior epigastric artery was medialized and the pre-peritoneal pad of fat was pushed up.

In cases of direct hernia, the sac along with its contents were reduced. In indirect hernia the cord was identified, the cord structures were anteriorized and the indirect sac was pulled back and pushed up along with the pre-peritoneal fat. Pre-peritoneal dissection was carried out laterally till the anterior superior iliac spine, medially till the lateral border of rectus abdominis, inferiorly till the pecten pubis and superiorly till the arcuate fibres. The inferior epigastric artery

was identified medially, femoral artery was identified laterally and the internal iliac vessels were identified inferiorly. A 11 x 6 cm polypropylene mesh was placed in the pre-peritoneal space covering myopectineal orifices.

The mesh was fixed to Cooper's ligament with 2-0 prolene suture and anchored along with the internal oblique muscle and transversalis fascia . The external oblique was sutured with 2-0 vicryl and the wound was closed in layers. It can also be done through a lower abdominal transverse incision.

**Elimination of Bias**

The most common type of bias that might be encountered during the study is Selection Bias, which was ruled out by including all the patients satisfying the Inclusion and Exclusion criteria in the study, instead of using any Simple Random Sampling methods to obtain the required sample size. Information bias was ruled out by accurately measuring and cross-checking all the key study variables at least 3 times before classifying them in the study.

**Statistical Methods**

Qualitative variables were calculated using the Chi-Square Test. Descriptive statistical values like sensitivity, specificity, positive predictive value, and negative predictive value were calculated using cross-tabulation of statistics. The mean and standard deviation were calculated for continuous variables. To compare the mean values between the two groups, the Unpaired t-test was used. To compare the mean values among more than two groups, the ANOVA test was used. A p-value of less than 0.05 was considered statistically significant. The data so collected as above, was compiled and tabulated in Microsoft® Excel and statistically analysed using IBM® SPSS® 20.0, for Windows®, to bring out the results of the study.

**RESULTS**

Overall (71)	Group	Mean ± SE	t value	P value
56.73 ± 2.62	DR	37.34 ± 1.17	14.856**	0
	OPPMR	75.58 ± 2.29		
Type of Repair		Duration(mins)		
DR		37		
OPPMR		75		

*Table 1: Duration of Surgery*

The average duration of surgery in DR was 37 minutes and 75 minutes in case of OPPMR, which was highly significant (p<0.05).

**Postoperative Parameters**

POGP	DR		OPPMR	
	Count	%	Count	%
POGP Day-1	4	11.40	26	72.20
POGP Day-3	0	0	16	44.40
POGP Day-7	0	0	4	11.10
POGP 1 Month	0	0	3	8.30
<i>Postoperative Groin Pain</i>				
SSI in OPPMR	Count		Percentage	
Yes	30		83.30%	
No	6		16.70%	

SSI in DR		Count	Percentage	
Yes		32	88.60%	
No		4	11.40%	
Surgical Site Infections		Frequency of SSI	Percentage of SSI	
DR		4	11.40%	
OPPMR		6	16.70%	
Surgical Site Infection				
FBS	DR		OPPMR	
	Count	%	Count	%
Absent	35	100	1	2.80
Present	0	0	35	97.20
Foreign Body Sensation				
Table 2				

Four patients in the DR group developed POGP on day 1, while the other patients were uneventful. In OPPMR group 26 on day 1, 16 up to day 3, 4 pts up to day 7, and 3 pts up to 1 month developed POGP. On postoperative day, SSI were identified and noted. In the DR group, 4 patients developed SSI, compared to 6 patients in the OPPMR group. In the OPPMR group, 35 patients out of 36 developed FBS. In the DR group, no patients developed FBS.

LOS	DR		OPPMR	
	Count	%	Count	%
No	33	94.30	25	69.40
Yes	2	5.70	11	30.60
Loss of Sensation				
Scrotal Edema	DR		OPPMR	
	Count	%	Count	%
Absent	33	94.30	20	55.60
Present	2	5.70	16	44.40
Scrotal Edema				
S/H	DR		OPPMR	
	Count	%	Count	%
No	31	88.60	26	72.20
Yes	2	5.70	10	27.80
Yes (minimal)	2	5.70	0	0
Seroma and Haematoma				
Table 3				

LOS is usually due to a nerve injury or transection. Patients were followed up on postoperative days, and the patients with loss of sensation over the groin were identified. Loss of sensation is absent in 94.30% of cases operated by Desarda’s no-mesh repair. Rest cases of only 5.70% have the LOS. The cases that are under the OPPMR group have a significantly higher LOS, which is 30.60%.

Scrotal oedema is studied in the patients which is done postoperatively and tabulated as follows. Desarda’s no mesh repair has a very low number of scrotal oedema cases, only 5.70%. The mesh repair has a higher scrotal oedema incidence of 44.40%.

Seroma and haematoma presence is compared between the procedures of repair. The procedure OPPMR consists of the incidence of seroma or haematoma. The percentage of

seroma or haematoma is 11.40% in Desarda’s no-mesh repair. The significantly high percentage of seroma is present in the OPPMR that is 27.80%.

DOHS (Days)	DR		OPPMR	
	Count	%	Count	%
1	25	71.40	4	11.10
2	9	25.70	16	44.40
3	1	2.90	6	16.70
4	0	0	4	11.10
5	0	0	2	5.60
<b>Overall (71)</b>	<b>Group</b>	<b>Mean ± SE</b>	<b>T-Value</b>	<b>P-Value</b>
2.17±0.18	DR	1.31±0.09	5.460**	0
	OPPMR	3.00±0.29		
<b>Duration of Hospital Stay</b>				
RTNA (Days)	DR		OPPMR	
	Count	%	Count	%
1	5	14.30	0	0
2	24	68.60	10	27.80
3	6	17.10	18	50.00
4	0	0	3	8.30
5	0	0	3	8.30
6	0	0	1	2.80
7	0	0	1	2.80
<b>Overall (71)</b>	<b>Group</b>	<b>Mean ± SE</b>	<b>T-Value</b>	<b>P-Value</b>
1.633±0.14	DR	1.02±0.09	4.865**	0
	OPPMR	2.22±0.22		
<b>Duration of Return to Normal Activity</b>				

**Table 4**

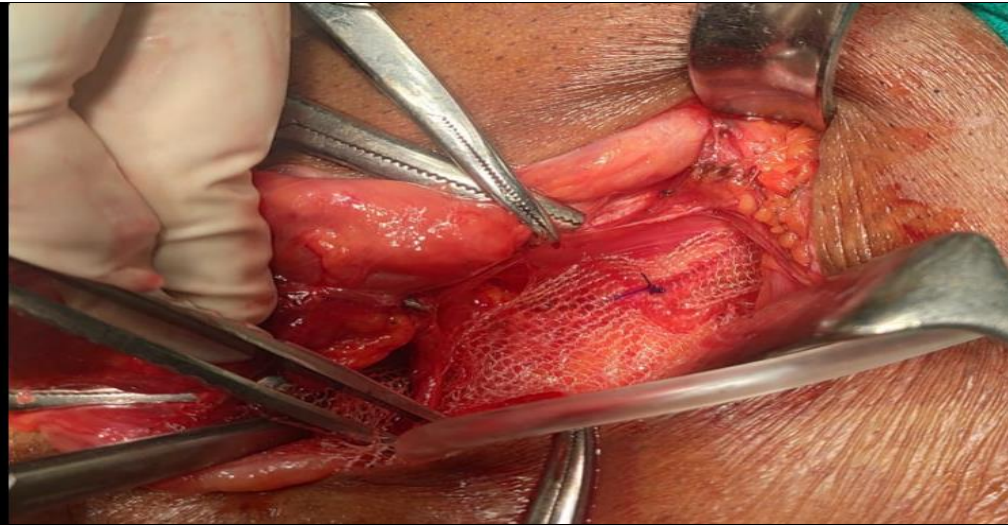
The duration of the hospital stay is compared between the two procedures. The duration is evaluated postoperatively. This is a key indicator that depends on the patient’s recovery from the disease condition. The DR procedure requires a one-day hospital stay. The OPPMR requires 3-4 days of hospitalisation. That is significantly (p<0.05) higher in the latter.

The duration of the return to normal activity is compared. Which shows the duration is 1 day in DR but 2-3 days in OPPMR. That is significantly (p>0.05) higher in OPPMR.

Recurrences	DR		OPPMR	
	Count	%	Count	%
Present	0	0	4	11.10
Absent	35	100.00	32	82.00

**Table 5: Recurrences**

There were no recurrences in the DR group within the follow-up period, and 4 cases out of 36 had recurrences in OPPMR.



**Image 1: Placement of Mesh in preperitoneal space covering myopectineal orifices  
(Arrow Mark : Fixing of mesh to Cooper's ligament)**



**Image 2: Final Picture after suturing the strip of external oblique aponeurosis  
to inguinal ligament and conjoint tendon**

## DISCUSSION

Inguinal hernia is a highly prevalent condition that is seen in patients. The complications that are seen in the older methods pave the way for the adoption of new techniques. The Lichtenstein procedure and other different mesh repairs cause different types of complications as they are mostly handled postoperatively by non-consultant staff worldwide. Surgeons who are not experts in hernia surgery are confused about the different procedures that have recently been introduced. Those are mesh repair, plug repair, plug and mesh repair, and PHS technique. The introduction of new techniques for hernia repair is required for the reduction of complications both during and after the procedure. Cases are handled by the general surgeons and post-operatively by the non-consultant staff, who need to be clear about the procedure to be followed. This present study consists of about 71 patients. It is a single-center, single-blind randomized, prospective, comparative two-group surgical study. Here is a comparison between two repair techniques, such as OPPMR and Desarda's no-mesh repair.

## Duration of Surgery



In this study, the findings show that the average duration of surgery in DR is 37 minutes and 75 minutes in the case of OPPMR. The requirement for more time in the later procedure matches with the result of a comparative study of open mesh repair and Desarda's no-mesh repair for inguinal hernia by Prakash and PB Mohan. In that comparison, the duration of surgery for Desarda's no-mesh repair is 45 minutes. Lichtenstein group requires 50 minutes of surgical duration.

Operative time was  $73.89 \pm 12.63$  min in Lichtenstein and  $72.60 \pm 13.89$  min in Desarda repair ( $P = 0.508$ ).<sup>[11]</sup> was stated by a comparative study and prospective cohort study of Desarda's technique with Lichtenstein mesh repair in treatment of inguinal hernia by B.S. Gedam, Prasad Y. Bansod\*, V.B. Kale, Yunus Shah, Murtaza Akhtar.

## Groin Pain

In the present study, it was found that 4 patients among the DR group developed POGP on day 1, while the other patients were uneventful. In OPPMR group 26, on day 1, 16 up to day 3, 4 up to day 7 and 3 pts up to 1 month developed POGP. So, it shows that post-operative pain in the groin region is less evident in Desarda's repair.

In the Desarda group, there was significantly ( $p < 0.001$ ) less post-operative pain measured on VAS on the 2nd POD, 7th POD and 1 month which is consolidated in the study of Abhishek Gupta et al.

## Surgical Site Infection

On postoperative day, SSI were identified and noted. In the DR group, 4 patients developed SSI, compared to 6 patients in the OPPMR group. This result of the present study concludes infection is more prevalent in OPPMR.

Surgical site infections (SSIs) [ $P = 0.04$ ] in the Desarda group were stated in the systematic review and meta-analysis to compare the non-mesh Desarda technique with the standard mesh-based Lichtenstein technique for inguinal hernia repair that was done by Ali Yaseen Y. Mohamedahmed et al. The conclusion of a higher incidence of surgical site infection matches with the study of Abhishek Gupta et al. in which 1/26 had wound infection and was statistically significant ( $p < 0.05$ ).<sup>[11]</sup>

## Foreign Body Sensation

In the OPPMR group, 35 patients out of 36 developed FBS. In the DR group, no patient developed FBS, which is highly significant. As in the study of Mohammad Sadik Akhtar, Suraj Kant Mani et al., the foreign body sensation was also significantly less in the Desarda group.

## Loss of Sensation over the Groin (LOS)

Loss of sensation is absent in 94.30% of cases operated by Desarda's no mesh repair, and in the rest, only 5.70% have the LOS. The cases that are under the OPPMR group have a significantly higher LOS, which is 30.60%. Which has nearly matched the study of Dr. Padmalakshmi Bharathi Mohan. The occurrence of complications like loss of sensation over the groin, scrotal oedema, abdominal wall stiffness was not seen in Desarda's group, whereas its occurrence was highly significant ( $p < 0.01$ ) in Lichtenstein's group in the referenced study.<sup>[5]</sup>

## Scrotal Oedema (SE)

Scrotal oedema is studied in the patients, which is done postoperatively, shows the percentage of scrotal oedema is more evident in the OPPMR. Desarda's no-mesh repair has a very low number of scrotal oedema cases, only 5.70%. The mesh repair has a higher more scrotal oedema incidence of 44.40%. Which shows significantly less scrotal oedema in the Desarda's no-mesh

repair. It matches with the comparative study of Dr. Padmalakshmi Bharathi Mohan et al. that complications like loss of sensation over the groin, scrotal oedema, abdominal wall stiffness was absent in the Desarda's group, whereas their highly significant ( $p < 0.01$ ) occurrence is seen in Lichtenstein's group.<sup>[5]</sup>

## **Seroma / Hematoma (S/H)**

In this study, the percentage of seroma or haematoma was 11.40% in Desarda's no mesh repair and 27.80% in the OPPMR. This value is highly significant. There was a lower rate of overall post-operative complications [ $P = 0.003$ ], seroma [ $P = 0.0004$ ] and surgical site infections (SSIs) [ $P = 0.04$ ] in the Desarda group.<sup>[7]</sup> Basic physical activity, chronic groin pain, cost, seroma formation, foreign body sensation were also significantly lower in the Desarda group.<sup>[14]</sup> Bruising and haematoma are common after hernia repair, and wound infection rates vary between 1% and 7%. Recent meta-analyses from a Cochrane review and from another review suggest that prophylactic antibiotics do not reduce the rate of surgical site infections.<sup>[16,17]</sup>

## **Duration of Hospital Stay and Return to Normal Activity**

Duration of hospital stay, return to normal physical activity, chronic groin pain ( $>3$  months) and foreign body sensation were statistically significant in Lichtenstein's repair as compared to Desarda's repair in the study of Ganesh Ganpatrao Degloorkar, Sanjeev Kumar Munoli. The result of the present study also shows a significantly ( $p < 0.05$ ) higher stay postoperatively in hospital in the OPPMR. A comparative study of the no-mesh (Desarda) technique versus the mesh (Lichtenstein) technique for primary inguinal hernia repair at a tertiary hospital.<sup>[15]</sup>

The mean stay in the author's technique was  $1.22 \pm 0.89$  days, while it was  $3.59 \pm 1.93$  days in the mesh group in the study of Desarda, Mohan and Ghosh, Abhishek (2006). This data nearly matches with the present study  $1.31 \pm 0.09$  and OPPMR  $3.00 \pm 0.29$ .<sup>[18]</sup> The mean time to return to work in the author's technique was  $8.48 \pm 2.43$  days, while it was  $12.46 \pm 2.11$  days in the mesh group.<sup>[18]</sup>

## **Recurrence**

There were no recurrences in the DR group within the follow-up period, and 4 cases out of 36 had recurrences in OPPMR. There was no recurrence seen with the author's technique while there were 4 recurrences in the mesh group (1.97%). by Desarda, Mohan and Ghosh, Abhishek et al.<sup>[18]</sup> No recurrence was detected in each group in the study by MS Akhtar et al. During the two-year follow-up in the referred study, no recurrence was observed. No recurrence was observed in both Desarda and Lichtenstein techniques as studied in "Comparative Study of Open Mesh Repair" by Abhishek Gupta et al.<sup>[19]</sup> One recurrence is noted in each arm ( $p=1$ ) by AH Ramu et al.'s study of comparison between the two.<sup>[20]</sup>

## **CONCLUSION**

Desarda's no-mesh repair is easy to learn, simple and takes less time to perform. It is also cost-effective. Desarda's repair is superior to open preperitoneal mesh repair in terms of postoperative pain, return to normal activity, and no foreign body sensation. Desarda's repair is superior to the mesh-based technique in terms of outcome.

## **AUTHOR CONTRIBUTION**

Dr Asiso kumar Pradhan (Guide), Dr Sanjit Kumar Nayak & Dr. Jitendra Kumar Sahoo have given their contribution in manuscript writing and Analysis, Pratibha Hemrom in Data collection.

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