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Hybrid Hernia Surgery for Abdominal Wall Hernia - A Case Series with Brief Review of Literature

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Abstract: ***All general surgeons operate abdominal wall hernia. This work presents hybrid repair technique with a long follow up (mean 1563 days). Cases included most types of ventral hernias. Author has used Laparoscopic Ipom Plus technique. This combines anterior rectus sheath open repair with excision of hernia sac and intra-peritoneal fixation of composite mesh. Total 82 cases operated from May 2028 till June 2024 were included. Out of these, 1 patient of HHR (Hybrid Hernia Repair) had intra-operative ileal injury, 3 patients of HHR had seroma, in open repair 2 patients had collection. Wound infection occurred in 1 case of HHR. In open group 2 developed wound infection. Of these in 1 patient mesh had to be explanted later. Hospital stay in HHR and Open repair group was 2-4 days. 1 patient in HHR group reported recurrence, 2 patients in open group had recurrence later. In follow up 2 Patients in the HHR group reported occasional moderate pain after surgery. Authors have performed Exploratory Data Analysis (EDA) using Python from high-quality scientific libraries. This study is non randomized with Selection bias (cases excluded - BMI >30, defect>10 cm). Concludes HHR as safe, effective, simple procedure, however requires further RCT.***

Keywords: Ventral Hernia, Incisional Hernia, Hybrid Hernia Technique, Ipom Plus

1. Introduction

Ventral hernia includes various abdominal wall hernia. These include incisional hernia, umbilical and para-umbilical hernia, epigastric hernia, Spegilian hernia and other rare hernia. This has to be operated by general surgeons occasionally or frequently. The repair of abdominal wall hernia has always posed a challenge to the surgeons. In the earlier days open anatomical repair of the hernia defect was practiced. In this technique scar tissue was separated into different layers and

Corresponding layers from both sides of the defect were sutured thus restoring the anatomy. With the advent of laparoscopic surgery, surgeons started doing abdominal wall hernia repair laparoscopically. However, it entails a long learning curve and time to master the suturing of anterior abdominal wall laparoscopically. To overcome the issue in last few years a modified Hybrid Hernia Repair Technique is being used by the surgeons due to its simplicity and good results.

The author uses Ipom plus repair that combines laparoscopic adhesiolysis, lap or open excision of hernia sac (depending on size of hernia), open repair of anterior rectus sheath defect and intra-peritoneal fixation of composite mesh with absorbable tackers.

2. Literature Survey

After midline laparotomy about 15% patients develop incisional hernia[1] (L. Matthijs Van den Dop et al). Various methods have been evolved for the repair of ventral hernia. Hybrid repair of abdominal wall has gained prominence in last few years and have become choice surgery for repair of ventral hernia[2] (Wasim MD et al). This is due to the fact that it is an easy technique and has improved results. The surgical technique combines advantages of open and laparoscopic surgery at the same time. In addition, it has fewer complications. Hybrid hernia surgery has been found useful in repair of medium/large ventral hernia[4,5]. However, the technique has yet to be standardized and long follow up is required[3] (Anil Sharma et al).

3. Subjects and Methods

This study presents authors experience of abdominal wall (ventral) hernia repair by hybrid technique by a single surgeon at a tertiary care hospital spreading over a period of 6 years (cases recruited from May. 2018 till June 2024) with a follow up from 16 months up to 89 months (all included cases were followed up till 31/10/2025).

Cases excluded –
1) Emergency hernia surgery
2) BMI >30 (These patients were referred for robotic surgery or surgeons using other techniques)

3) Hernia defect >10 cm (referred for other repair techniques)
4) Ventral hernia cases combined with other surgical procedure
5) Cases that could not be followed up

Cases in this study (Table 1, Table 2, Table 3) –
Male 37, Female 45

Laparoscopic Ipom Plus repair was done in 63 patients. In all these cases repair of hernia defect was done (In 5 cases defect size was < 5mm and hence shoe lace repair was done).

In 19 cases open repair of ventral hernia was done with use of on lay proline mesh.

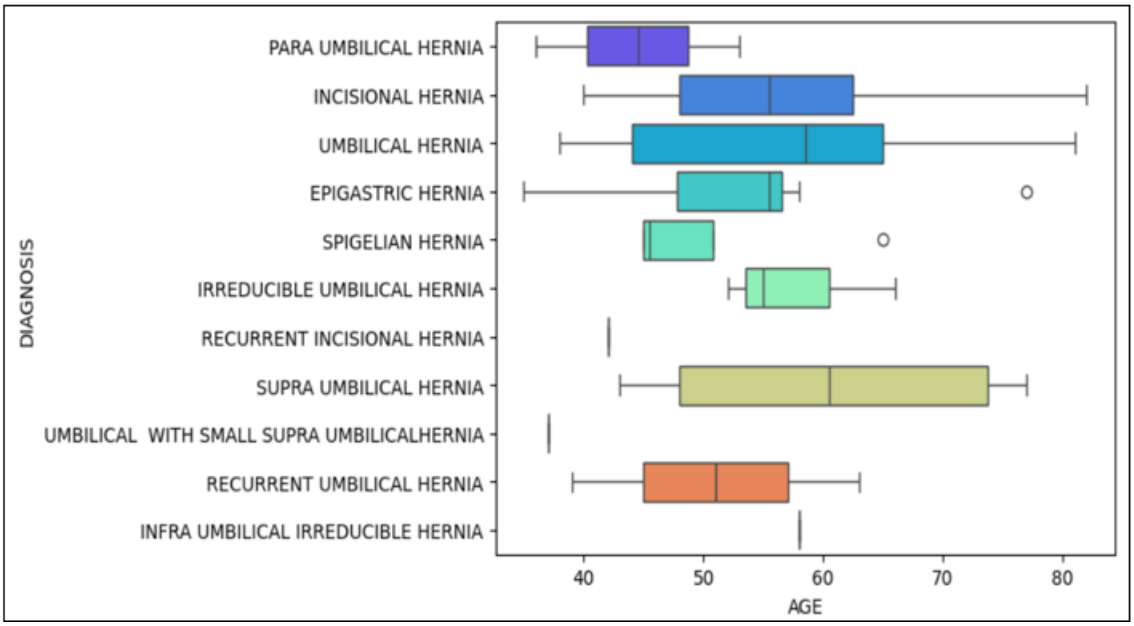
Table 1: Number of cases -Procedure wise

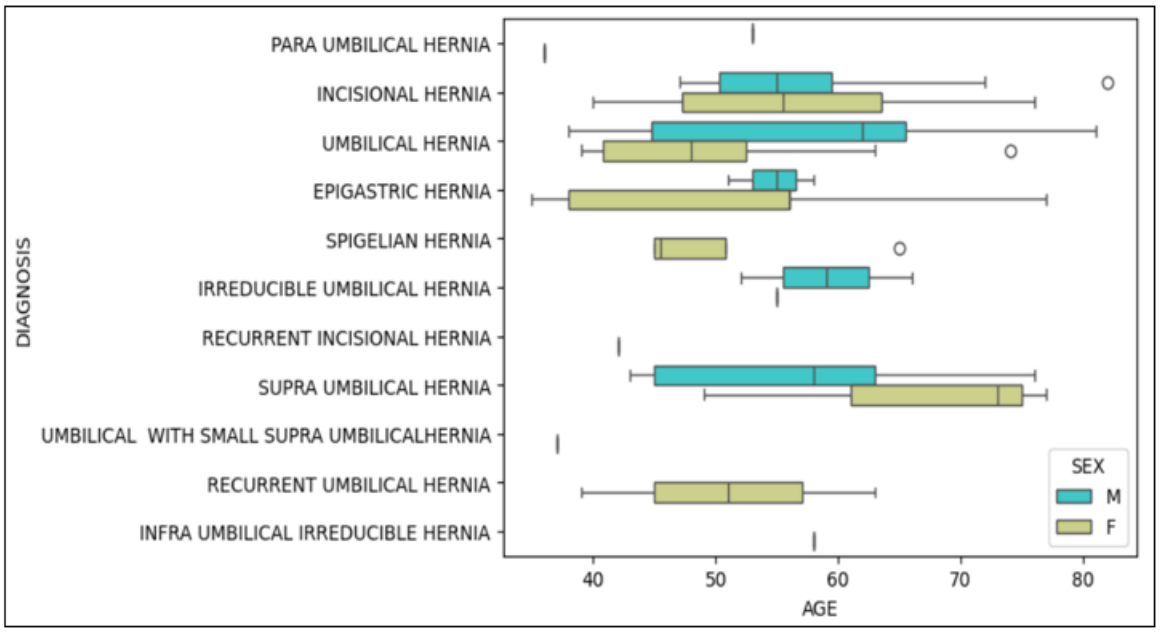
Lap Ipom Plus	63
Open Repair	19

Table 2: Diagnosis

Incisional Hernia	28
Umbilical Hernia	24
Epigastric Hernia	8
Supra Umbilical Hernia	8
Spigelian Hernia	4
Irreducible Umbilical Hernia	3
Recurrent Umbilical Hernia	2
Para Umbilical Hernia	2
Recurrent Incisional Hernia	1
Umbilical with small Supra Umbilical Hernia	1
Infra Umbilical Irreducible Hernia	1

Table 3: Types of Hernia with age and sex distribution:
Males = 37, Females = 45





Operative Technique:
In all cases a thorough pre-operative work up was done. It included NCCT of abdomen to see for contents of hernia, any dense adhesions and also defect size.

Salient features of operative technique:
1) Veress needle was used for insufflation.
2) Intra-peritoneal pressure was kept at 14 mm except during mesh fixation it was kept at 7 to 10 mm.
3) Entry was done by use of 12 mm Opti view port. Two 5 mm ports were made above and below it in triangulation for good ergonomics.
4) Adhesiolysis and reduction of hernia contents was done laparoscopically; irreducible hernia contents were reduced by open method.
5) After reduction of hernia pneumoperitoneum was decompressed and an incision was given over the hernia defect, hernia sac dissected and excised.
6) Hernia defect repaired with no.1 ethilon loop.
7) Intra-peritoneally suitable size composite mesh was fixed with absorbable tackers at about 1.5 cm distance each.
8) A final inspection was done for any hematoma, fluid collection or sign of intestinal or visceral injury. Wounds closed with staplers.

4. Results

Cases included – Ventral hernia cases included in this study were operated from 1/5/2018 -30/6/2024 – 82 Patients

Follow up period from 16 months – 89 months

Mean Follow up – 1563 days

Mean age - 55.3 years

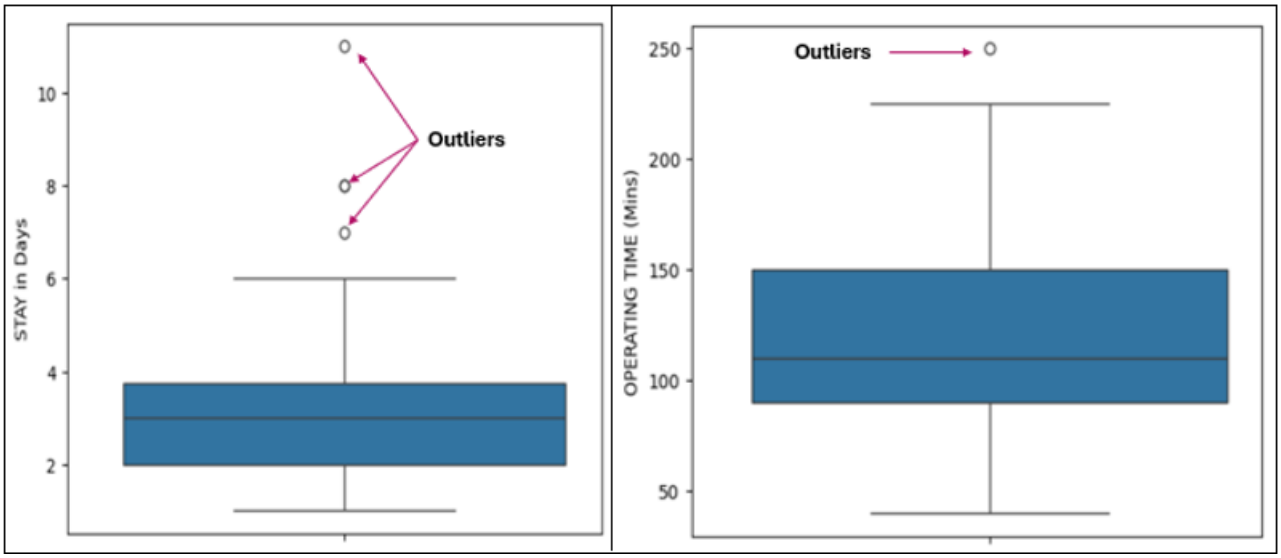
Mean operating time - 117 minutes

Mean stay in hospital - 3.2 days (Table 3, Table 4)

Table 4, Table 5

Statistics at a glance: Age, Operating time, Stay in days, Follow up period

	Age	Operating Time in minutes	Stay in Days	Follow-up period in Days
Min	35	40	1	489
Mean	55.3	117	3.2	1563
Median	55	110	3	1482
Maximum	82	250	11	2734
Std	11.9	43.3	1.5	727.7



Complications and Follow up:

Table 6: Operative, Peri-operative and Later Complications

	Hybrid Hernia Surgery	Open (Onlay mesh) Repair
Ileal injury	1*	Nil
Seroma	3	2
Wound infection	1	2**
Recurrence	1	2
Occasional pain	2	Nil

* Converted to open surgery
** In one diabetic patient due to recurrent uncontrollable wound infection mesh was explanted later at another center.

Statistical Analysis used:
Exploratory data analysis (EDA) is a statistical approach that aims at discovering and summarizing a dataset by means of univariate, bivariate and multivariate visualization techniques. It is the systematic investigation of a dataset to discover patterns in the data, identify anomalies and unveil hidden insights. EDA for the present work was performed using Python programming language, which is an object-oriented, open source, high performance programming language with easy syntax, powerful tools and extensive availability of libraries. These libraries are designed to simplify the data analysis workflow as each module in a

Python library serves a specific purpose. We have used following Python libraries for this work.

1) Pandas: Data Loading, cleaning, Data Manipulation & Transformation and Data Analysis and Statistics
2) NumPy: Numerical computing, data manipulation & data analysis
3) Matplotlib: Data visualization
4) Seaborn: Statistical data visualization

5. Discussion

L. Matthijs Van den Dop et al[1] in a meta-analysis that included 11 studies reported enterotomies in 1.8% of hybrid repair with 23% having surgical site infection. Sharma, A et al[3] in a review that included 218 articles reported surgical site infection in 6.53% with a recurrence rate of 3.29%. Hiekkaranta, J.M. et al[4] in a prospective randomized multicenter long-term study of 193 patients have reported a high recurrence rate 16.9% and 16.7% for hybrid and laparoscopic group respectively. Yang S et al[5] in an article compared outcomes and complications of open, laparoscopic and hybrid repair intra-operative enterotomy in 1.5%, post operative fistula formation in 3.3%, and a recurrence rate of 1.3% in cases of hybrid repair. Bell-Allen N et al[6] in a prospective study of 44 patients have reported a recurrence rate of 9% in hybrid repair. Quan Wu et al[7] in a systemic review and meta-analysis that included 14 studies involving 1158 patients did not found hybrid surgery to better than laparoscopic repair. Bhatia M et al[8] in a review study of 67 patients found early results encouraging with good patient satisfaction.

Table 7: Comparative Series/Studies – A Review

	Inta operative complications (enterotomy, bleeding, bladder injury)	Surgical Site Infection	Post operative complication requiring intervention-Intestinal fistula	Post operative complication seroma	Recurrence	Quality of life -Chronic Pain	Other specifics
Van den Dop LM et al. Hernia 2021	HHR 1.87% LHR 2.8%	23% 26%	1.5% 4.17%	5.3% 10.4%			11 Studies n = 1681
Wasim MD et al. JMAS 2020						0	BMI 20-25 Shorter follow up max 2 yrs n=75
Sharma A, et al. JMAS 2021	HHR	6.53%		5.47%	3.29%	4.49%	Review 218 Articles
Hiekkaranta et al. Hernia 2024	HHR LHR				16.7% 16.7%	Same for both groups	Long term (Median follow up 87months) Prospective, Randomized multicentre study n=193
Yang S et al. WJCC 2022	HHR 1.5% LHR 4.1 Open 6.1%		3.3% 6.8% 2.4%		1.3% 12.3% 8.5%		Mean 41 months follow up
Bell-Allen N et al. ANZ Surg. 2022	HHR	7%		7% Wound Hematoma 2 Minor complications 18%	9%		
Quan Wu et al. 2023BMC Surgery	HHR	OR=2.10, P=0.04		Seroma(OR=0.29, P=0004			Did not find a clear advantage of HHR over LHR N=1158
Present Series	HHR 1 Open 0	1 2		3 2	1 2	2 Occasional moderate surgery 0	Non randomized, Exclusions-BMI >30, DEFECT >10 CMS

Limitations:

This is a non – randomized study.
It has selection bias - cases having defect>10 cm or with BMI >30 were excluded

6. Conclusions

Hybrid hernia repair (Ipom Plus) is a safe, effective, simple procedure with acceptable results in Ventral hernia surgery. Further Randomized control trial is required to prove benefits of hybrid hernia over other types of ventral hernia repairs.

Author Contributions:

First Author - Operated all cases, concept, design and writing the paper.
Second Author - Data analysis and all Statistical work.
Third Author – Data extraction and follow up of all cases included in this study.

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