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Comparative Study between eTEP-RS and IPOM Surgery: Our Experience

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Abstract: ***Introduction: Based on aetiology, the European hernia society (EHS) divides ventral hernias into primary or congenital hernias and acquired hernias. The open approach was the treatment of choice for ventral hernias. The laparoscopic approach was introduced in 1993, offering another approach to repair these hernias. Our study is a comparison between two laparoscopic repair techniques, Intraperitoneal mesh repair (IPOM) and Extended totally extraperitoneal Rives-Stoppa (eTEP RS). Aim and Objectives: To compare eTEP RS and IPOM technique in uncomplicated ventral hernia repairs. Materials and Methods: Done as Prospective comparative study conducted from January 2020 to December 2020. The study population was 40, with 20 in each group. Results: We found that mean hospital stay and procedure cost was less in eTEP RS group as compared to IPOM group. Operative time was significantly more in eTEP RS group when compared to IPOM group. Discussion: Minimally invasive methods used for ventral hernia repair should meet the objectives of open surgical techniques. Between the two minimally invasive methods compared the eTEP RS has the advantages of costing less, with shorter hospital stay, but had longer operation times, when compared to IPOM. Conclusion: The eTEP RS can be considered as an effective alternative to the IPOM as it is cost effective, associated with less post operative pain and allows patients to resume their daily activities very early but has long operative time and is technically challenging.***

Keywords: Ventral hernia, eTEP RS, IPOM

1. Introduction

A Ventral hernia is defined as a protrusion of loops of intestine, fat or fibrous tissue through a defect or weakened region of the abdominal wall[1]. European hernia society divides ventral hernias into primary or congenital and incisional hernias. The first group includes midline (epigastric and umbilical) and lateral hernias (lumbar and spigelian) and the second group includes Incisional hernias which are categorised by their localisation on the abdomen[2].

Ventral hernia repair is one of the most common operations performed by general surgeons. Hernia repair includes primary repair ie., simple closure of defect or usage of prosthetic materials like mesh to decrease the rate of recurrences[3]. However, the mesh is placed in a variety of ways. Various positions for mesh placement include onlay, sublay, preperitoneal and intraperitoneal (Table 1) [4]. The gold standard in open ventral hernia repair is the Rives-Stoppa technique which involves restoration of the linea alba and a prosthesis placement in the retromuscular plane[5].

The first revolution in treating hernias through laparoscopy with the placement of intraperitoneal mesh (IPOM) was first introduced in 1993 by Karl LeBlanc and Booth. Laparoscopic repair provided less surgical site infection, a shorter length of stay, and a similar recurrence rate when compared to the open technique. Limitations of IPOM repair were larger defects, prosthetic erosion, intestinal obstruction from adhesions, acute and chronic abdominal pain due to traumatic fixation methods. To avoid placement of the prosthesis in the peritoneal cavity and its complications other techniques were developed, which include:

TAPP - Trans-abdominal preperitoneal approach,

TES - Totally endoscopic sublay repair,

EMILOS - endoscopic mini/less open sublay technique,

Retro- rectal sublay mesh repair,

SCOLA - Subcutaneous onlay laparoscopic approach,

e-TEP - extended view-totally extraperitoneal approach.

e-TEP RS technique (Extended totally extraperitoneal Rives-Stoppa) is the combination of minimally invasive e-TEP technique with rives-stoppa's surgical steps. This involves strengthening the abdominal wall and avoids the placement of mesh in contact with abdominal viscera and its

transparietal fixation[5][6].

In this article, we present our short-term results comparing IPOM repair and eTEP RS repair techniques in the repair of uncomplicated ventral hernia repair.

Aim and Objectives
To compare eTEP-RS and IPOM techniques in uncomplicated ventral hernia repair.

Inclusion Criteria:
Patients with uncomplicated ventral hernia (Primary and incisional) with defect size between 2 to 5 cm.

Exclusion Criteria:
1) Patients who are not fit for general anesthesia (GA),
2) Defect size greater than 5 cm,
3) Patients with lateral hernias,
4) Patients with complicated ventral hernias like Irreducible, obstructed and strangulated hernias.

2. Materials and Methods

We did a Prospective comparative study from January 2020 to December 2020. Patients were explained about both the procedures, their merits and demerits and were asked to choose the procedure which they want to undergo.

Basic data like age, sex, smoking habits, primary or incisional hernia were collected and compared. Pre operative ultrasonography was done for all patients to assess defect size and location of hernia.

IPOM Procedure:
Under GA, pneumoperitoneum was created using veress needle or Hassan technique and 3 ports placed on left side. Hernia contents were reduced using sharp and blunt dissection. Composite dual side mesh placed and fixed with transfacial sutures and absorbable tackers with atleast 5 cm coverage of the defect in every direction.

eTEP RS Technique:
Pre-operative marking of linea alba, lineasemilunaris and hernia site is done (Figure 1). Under GA, Foley catheterisation was done approximately 12mm incision made about 3cms below the left costal margin and subcutaneous tissue dissected to the point of anterior rectus sheath. After sharp incision of fascia, muscle bluntly retracted and posterior rectus sheath is reached. 10mm trocar placed here and one 5mm and another 10mm trocar placed near semilunaris line (Figure 2).

After creating adequate plane on the left side, process of crossover initiated by making incision over the medial aspect of posterior rectus sheath and crossing over to the preperitoneal space under linea alba to contralateral posterior rectus sheath is achieved (Figure 3). After incision of contralateral posterior rectus sheath and an adequate dissection in contralateral retrorectus space, 10mm trocar is placed. Above described dissection continues to the level of xiphoid process cranially and to the space of retzius caudally. Lateral dissection done until point of semilunaris line in both sides. When the hernial defect is reached, we try to push down the hernial sac and its contents back into the abdominal cavity, without opening the peritoneum, but if that is not possible, entrance into the hernial sac, adhesiolysis and suturing of the created rent is performed (Figure 4). When complete retrorectus dissection is achieved,we suture the linea alba, the defect and also the posterior rectus sheaths one to another, using suture material (Figure 5).

After internal measurement of the created space, well- sized wide polypropylene mesh is positioned to cover the whole retrorectus space with minimal (1-2 tackers) /without fixation (Figure 6). Pneumoperitoneum is released under vision ensuring proper mesh position sandwiched between the muscle and posterior rectus sheath. Pressure dressing applied and patients were discharged on POD 2.

3. Results

(Table 2)
Forty patients were included in the study - 20 (11 females and 9 males) eTEP RS ventral hernia repairs and 20 (7 females and 13 males) IPOM repairs. There were 36 primary and 4 incisional hernias. Mean age was 45.6 years in eTEP RS group and 47.1 years in IPOM group. Mean defect area was found to be 12 cm^2 in eTEP RS and 11.6 cm^2 in IPOM group. Operative time was significantly longer in e TEP RS with mean 180.1 min and 53.4 min in IPOM group (figure 7). Mean hospital stay was found to be 2.7 days in eTEP RS group and 3.3 days in IPOM group (figure 8). Cost of surgery was significantly lower in eTEP RS group with mean cost of Rs 41,131 and Rs 88,656 in IPOM group (figure 10) . Using visual analogue scale, mean pain scores were noted for all patients in both groups on Post operative day (POD) 1 and on day of discharge. We found that mean pain scores on POD 1, on day of discharge and on POD 7 was found to be 3.51, 1.6, 1.2 in e TEP RS group and 7.35, 3.2 and 2.8 in IPOM group respectively (figure 9). 2 had hematoma and 4 had seroma formation in eTEP RS group and none of the patients had hematoma or seroma in the other group. One patient had recurrence of hernia in IPOM group. One patient got re admitted on POD 28 with features of sub acute intestinal obstruction who was managed conservatively in IPOM group. 8 patients had dull aching pain for an average period of 1.2 months post operatively in IPOM group which is not seen in eTEP RS group.

4. Discussion

Nowadays, surgeons have many options to repair ventral hernias from open techniques with different mesh positions to various minimally invasive techniques like SCOLA, EMILOS, eTEP RS etc[7]. Despite the enormous progression in ventral hernia repairs in the last two decades, optimal treatment of ventral and incisional hernias still has not been established[8]. The main objectives of open hernia techniques are: complete reconstruction of the wall by

restoration of continuity of the aponeurosis, tension free closure, and mesh placement. It is key that minimal invasive surgery of abdominal wall should meet these above mentioned objectives of open surgery[9].

From the data available so far, it is clear that optimal space for mesh placement is the retromuscular or preperitoneal space. The second key aspect is the necessity to place the largest mesh possible as it is know that a strict determination of 5 cm margin around the defect is insufficient for medium and large hernias. In such hernias, the minimum mesh width should be four times larger than the hernia orifice radius[10][11][12]. The eTEP technique for abdominal repair complies with principles published by rives and stoppa: reduction of hernia content, closure of posterior fascial or peritoneal defect, closure of anterior fascial or midline defect and placement of sufficiently large prosthetic mesh[9]. Hence the name eTEP RS.

eTEP RS was first described by Igor belyansky which allows placement of wide inter parietal uncoated prosthetic mesh with minimal or no fixation in the retrorectus space. eTEP-RS technique provides an almost completely extraperitoneal plane of surgery in an ergonomic and reproducible system[13]. This surgery avoids foreign bodies (mesh) in abdominal cavity, that would lead to less mesh related complications. eTEP RS also has all the benefits from the minimal invasiveness of the procedure. This procedure uses minimal fixation or no fixation at all. The greatest disadvantages of e TEP are prolonged time even in expert hands due to technical difficulties during the surgery. Also the learning curve of eTEP approach may be steep, requiring advanced laparoscopic skills[7].

Mean duration of e TEP RS procedure was found to be 180.1 min in our study when compared to 218.9 min and 186 min according to Belyansky et al[14] and Penchev et al[7] respectively. Mean duration of hospital stay was 2.5 days in our study when compared to 1.8+/-1.8 and 3.9 days according to Belyansky et al[14] and Andreuccetti et al[13] respectively. Average pain scores were 3 (VAS 0-8) and 3 (VAS 0-6) on POD 1 and at the time of discharge according to Sergio et al[9] comparable to 3.6 and 1.6 seen in our study. Seroma formation was found to be 20% in our study compared to 14.8% and 5.2% according to Penchev et al [7] and Andreuccetti et al[13].

Our study shows comparision between two minimally invasive procedures ie., eTEP RS and IPOM. The difference between two procedures are mean postoperative pain scores and operative time. Dull aching abdominal pain for an average period of 1.2 months seen in 40% of population in IPOM group which is not seen in other group. The longterm benefits of sublay mesh position need to be kept in mind compared to intra abdominal prosthesis. Drawbacks of this study include small sample size and short follow up. The follow up is insufficient to comment on recurrence rates.

5. Conclusion

eTEP RS appears to be an effective alternative for IPOM procedure as it is cost effective, associated with less post operative pain and allows patients to resume their daily activities early.

However, long term follow up is required to assess recurrence rates.

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Table 1 (4):

Mesh Position Nomenclature	Anatomic Location
Onlay	Anterior to anterior rectus fascia
Retro rectus/ Sublay	Posterior to rectus abdominis muscle/ anterior to posterior rectus fascia
Preperitoneal	Posterior to posterior rectus fascia/ anterior to peritoneum
Intraperitoneal	Posterior to peritoneum

Table 2: Results

		IPOM	e TEP RS	
Age	15-30 years	1	1	not significant
	31-45 years	7	9	
	>45 years	12	10	
Sex	Male	13	9	not significant (p value > 0.05)
	Female	7	11	
Diagnosis	PUH	17	19	not significant (p value > 0.05)
	Incisional hernia	3	1	
Time of surgery		53.4 minutes	180.1 minutes	significant (p value < 0.05)
Hospital stay		3.3 days	2.7 days	significant (p value < 0.05)
Cost of surgery		Rs. 88,656	Rs. 41,131	significant (p value < 0.05)
Pain scores	POD 1	7.35	3.51	significant (p value < 0.05)
	At discharge	3.2	1.6	
	POD 7	2.8	1.2	
Seroma formation		0	4	not significant (p value > 0.05)
Hematoma formation		0	3	not significant (p value > 0.05)
Recurrence		1	0	not significant (p value > 0.05)
Dull aching abdominal pain		8	0	significant (p value < 0.05)
Re-admissions		1	0	-

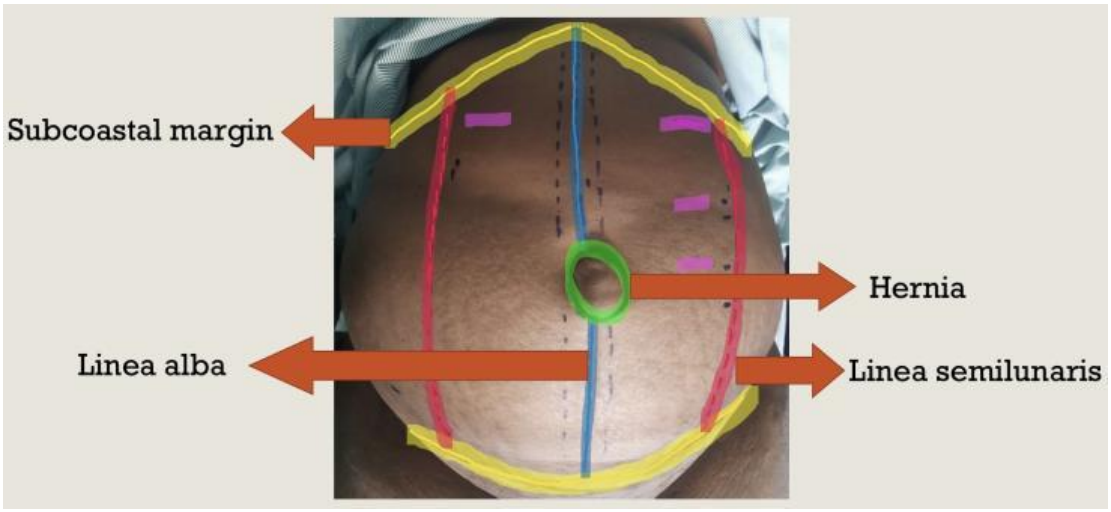

Figure 1: Pre operative marking

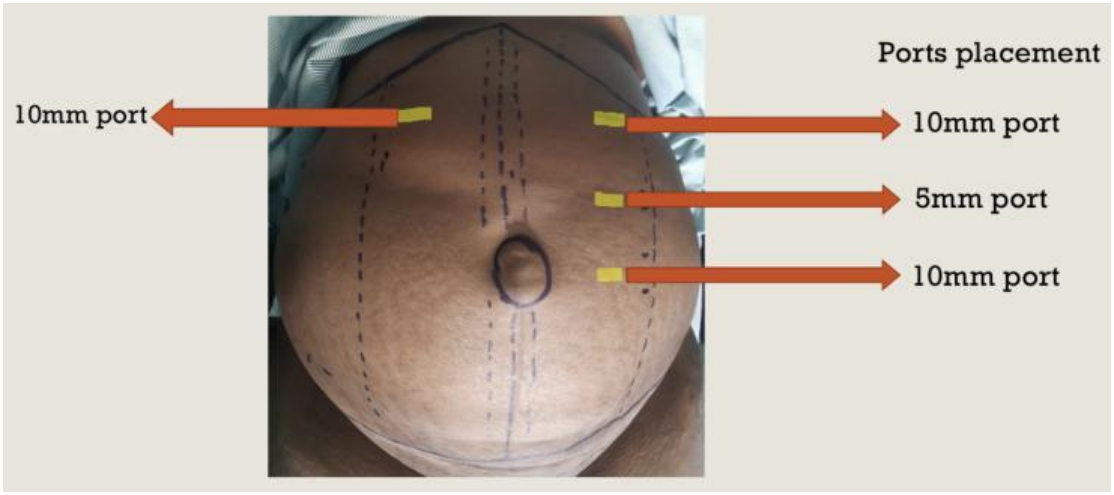

Figure 2: Ports placement

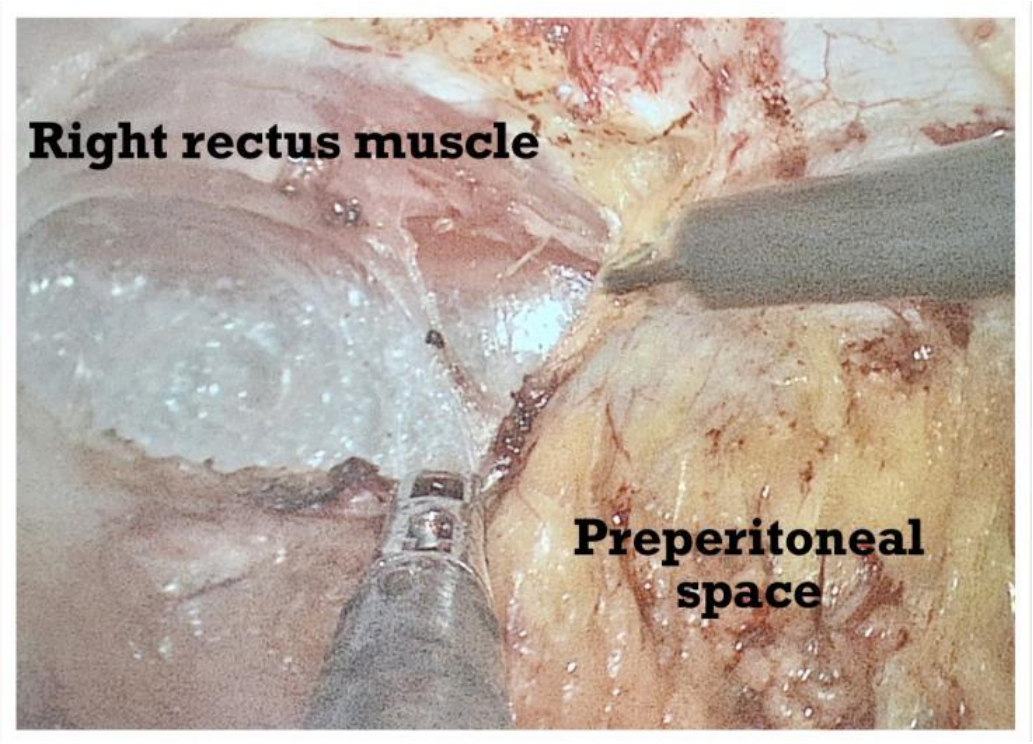

Figure 3: Crossing over to opposite retrorectus plane

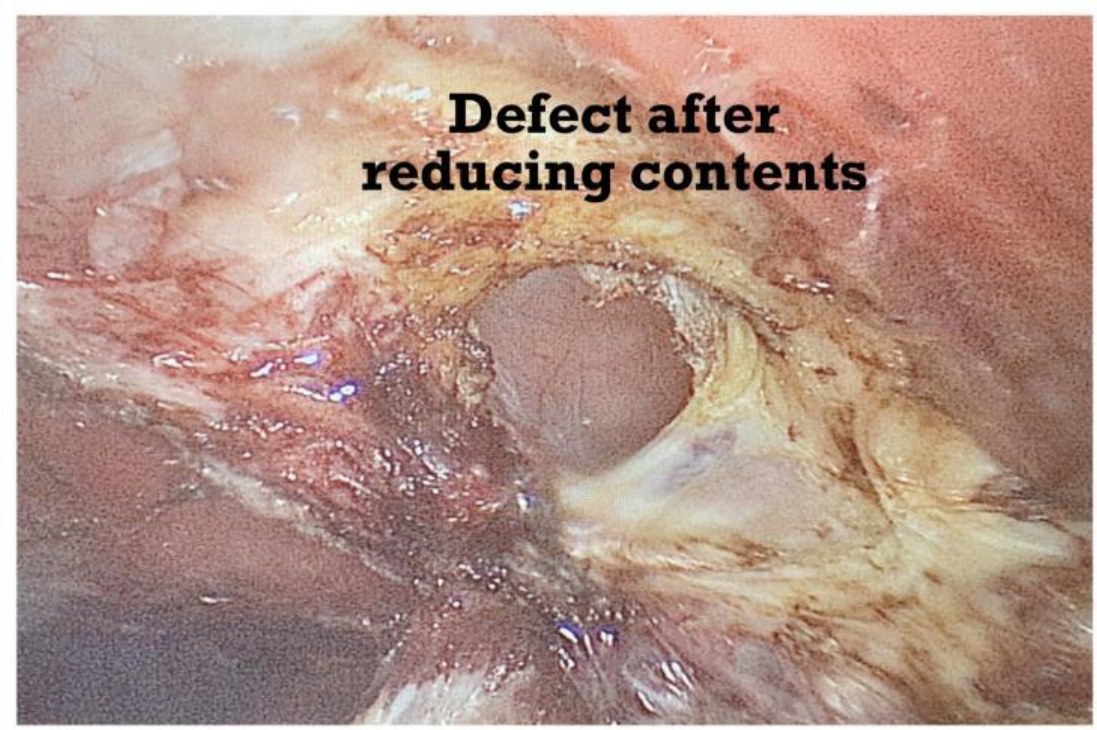

Figure 4: Defect after reducing the contents.

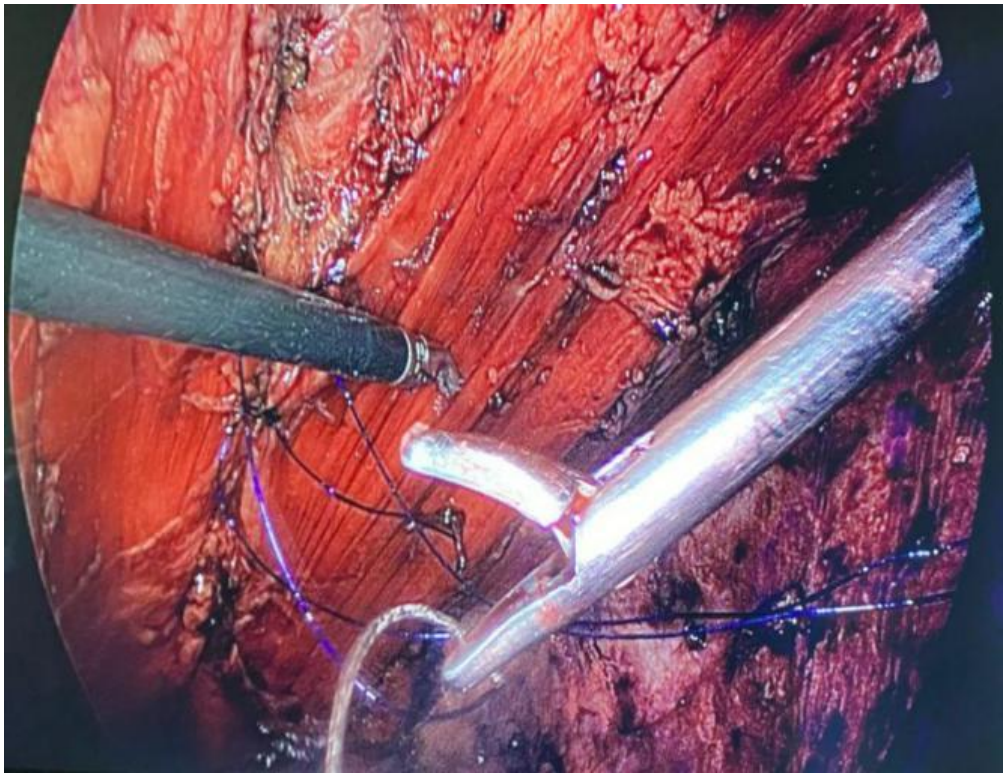

Figure 5: Suturing of linea alba.

Figure 6: After placement of 15x30 cms polypropylene mesh.

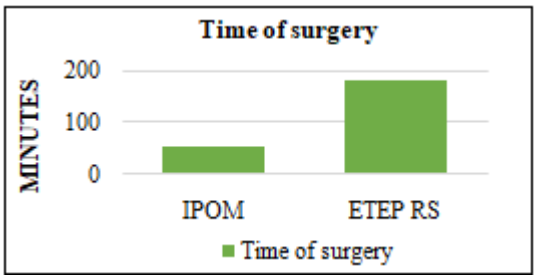

Figure 7: Graph comparing time of surgery between IPOM and ETEP RS

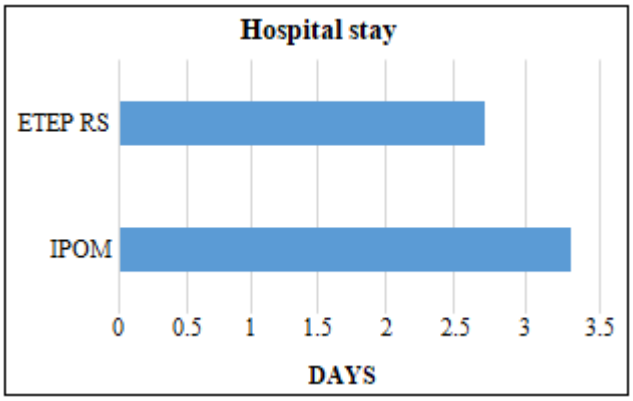

Figure 8: Graph comparing hospital stay between IPOM and ETEP RS

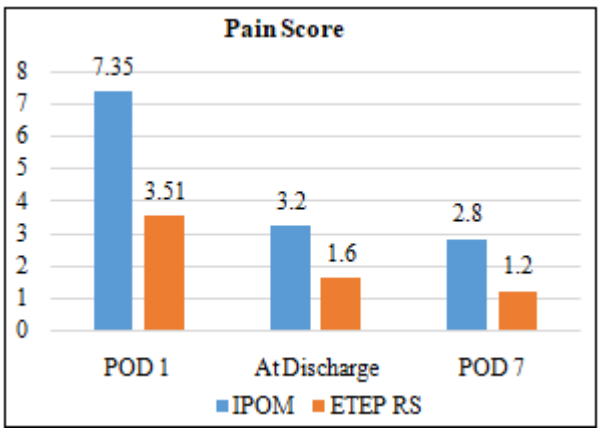

Figure 9: Graph comparing pain scores between IPOM and ETEP RS

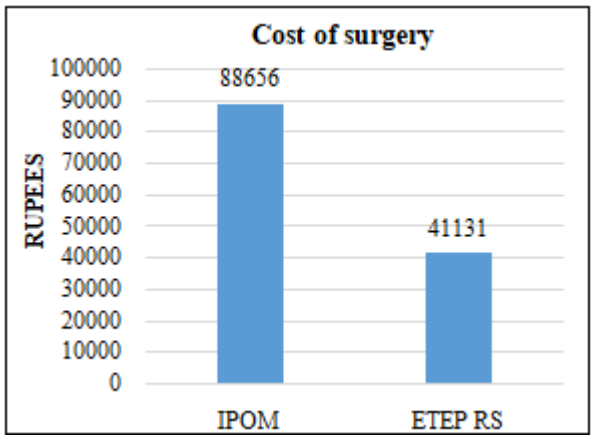

Figure 10: Graph comparing cost of surgery between IPOM and ETEP RS