

## Prolene Hernia System (PHS) in Primary Umbilical Hernia: Feasibility and Benefits

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### Abstract

Prolene Hernia System (PHS) has gained widespread acceptance over the past few years. This is an original prosthetic device that combines in a single step, what other techniques offer separately, namely an under lay patch, connector, and over lay patch. This was to study the feasibility of using PHS for umbilical hernia repair and the outcome benefits against the traditional onlay mesh repair. Included in the study were 18 patients, 13 patients with adult para-umbilical hernia, and five patients with umbilical hernia between February 2015 till December 2015. Their ages ranged from 28 to 62 years with a mean  $\pm$  SD of  $44.7 \pm 11.1$  years. Ten patients repaired with PHS, eight repaired with onlay mesh. The mean operative time for PHS was  $54.5 + 12.5$  min, that for onlay mesh was  $50 \pm 11.7$  min. This was insignificant ( $P < 0.5$ ). The mean long of stay was  $3 \pm 1.1$  days for PHS; it was  $4.25 \pm 0.6$  days for onlay mesh repair ( $P < .01$ ). The mean analgesic tablets in take were  $4.9 + 1.6$  tablets for PHS and it was  $11.1 \pm 3.5$  tablets for onlay mesh repair. This difference was highly significant ( $P < .001$ ). The mean time for return to work was significant for PHS ( $P < .02$ ). In conclusion PHS repair for umbilical hernia seemed to be feasible for selected cases as it is associated with less post operative pain and less analgesic necessity.

**Keywords:** Umbilical hernia; Prolene hernia system.

## Introduction

Umbilical hernia in adults occurs long after closure of the umbilical ring and it is due to a gradual yielding of the cicatricial tissue closing the ring. It is more common in women than in men. Predisposing factors include multiple pregnancies with prolonged labor, ascites, obesity, and large intra-abdominal tumors [1]. Umbilical hernia represents 6% of all abdominal wall hernia in adults [2].

In adults, umbilical hernia does not usually obliterate spontaneously, as in children, but instead increases steadily in size. The hernia sac may have multiple locations. Umbilical hernias usually contain omentum, but small and large bowel may be present. Emergency repair is often necessary, because the neck of the hernia is usually quite narrow compared to the size of the herniated mass and strangulation is common [3].

Umbilical hernia in an adult should be repaired expeditiously to avoid incarceration and strangulation. The umbilical dimple should be preserved if possible and the fascia approximated with non-absorbable suture. A transverse closure of the aponeurotic defect results in the strongest repair. Large umbilical hernia defects that cannot be closed without undue tension should be closed with non-absorbable mesh [4].

The presence of cirrhosis and ascites should not discourage repair of an umbilical hernia, since incarceration, strangulation, and rupture are particularly dangerous in patients with these disorders. If significant ascites exists, however, it should first be controlled medically or by peritoneovenous shunt if necessary, since morbidity and recurrence are higher after hernia repair in patients with ascites. Preoperative correction of fluid and electrolyte imbalance and improvement of nutrition will improve the outcome in these patients [5].

Prolene hernia system (PHS) is an original prosthetic device that combines, in a single step, what other techniques offer separately, namely an underlay patch (preperitoneal placement), an onlay patch over (fascial placement) and a connector that joints them together and works as a plug [6].

The PHS is constructed of high-porosity polypropylene for optimum tissue ingrowth. The PHS has many theoretical advantages over the other conventional forms of repair. It provides a larger allowable surface for effective tissue ingrowth and fibrosis. The underlay patch lies in the preperitoneal space and provides a double layered reconstruction of the transversalis fascia [7].

Placement of the underlay component in the preperitoneal plane has theoretical advantages. It employs Pascal's principle of hydrostatic pressure to allow the intra-abdominal pressure to keep the mesh secure in place. It has all the advantages of a secure posterior repair from a simple anterior approach. It is a versatile prosthesis that can be used for other abdominal wall hernia repairs [8].

## Patients and Methods

18 patients were included in the study, 14 were females and 4 were males, between Feb. 2015 – December 2015. Their ages ranged from 28 to 62 years with a mean age  $\pm$  standard deviation of  $44.7 \pm 11.1$  years. All patients presented with virgin hernias without previous surgical intervention. All the cases included in the study were reducible without any hernia complications. Excluded those who had defects larger than 4 cm, those with an American Society of Anesthesiology (ASA) score IV, those with cardio-pulmonary insufficiency, renal failure, hepatic impairment. 13 patients presented with adult para-umbilical hernias above the umbilicus, 5 with umbilical hernias through the umbilicus. 10 patients their hernias treated by the PHS (7 para-umbilical, 3 umbilical). 8 patients treated by onlay repair with mesh (6 para-umbilical, 2 umbilical).

All patients received anti-thrombotic prophylaxis in the form of compression stocking, subcutaneous LMWH. All operations were performed under general anesthesia; at induction of anesthesia all patients received antibiotic prophylaxis. Using standard sterile surgical procedures the skin was prepared with povidone-iodine solution.

## Surgical Technique

**I. PHS:** Through transverse skin incision the sac was isolated, dissected free all around, then the peritoneum was separated from the posterior aponeurosis creating enough space in the preperitoneal area to accommodate the underlay patch of PHS. Accidental peritoneal lacerations were closed to avoid future intestinal adhesions. The edges of the aponeurosis were closed with interrupted sutures leaving only a hole through which the connector passed through. The only patch was fixed to the anterior rectus sheath with poly propylene suture, then the skin was closed after insertion of a haemo vac and if the hernia was umbilical, the umbilicus was sutured to the connector with an absorbable material.

**II. Onlay Repair with Mesh:** After dissecting the sac, the defect closed with poly propylene, then the mesh was applied tension free with interrupted 2/0 poly propylene on the anterior rectus sheath.

**Assessment**

The duration of surgery, intra-operative events, mesh application success long of hospital stay (LOS), post operative complications (haematoma, infection, seroma). Pain levels were recorded through asking patients to describe their pain using a verbal rating scale (0, no pain to 5 excruciating).

All patients received post-operative 50mg – 100mg pethidine as a routine dose, it may be repeated the night of the operation. Next day 75mg dose of diclophenac sodium was given according to the severity of pain, total then a tablet (46.5mg diclophenac sodium) was given starting 2<sup>nd</sup> day. Analgesic consumption was recorded during the first post operative week. Post-operative complications in the form of seroma, hematoma, and wound infection were recorded. The timing of return to work was also determined.

**Statistical Analysis**

The data obtained were statistically analyzed using T-test to find the standard error of the difference between

two means and testing the size of the difference by this standard error to find out the degree of probability [9].

**Results**

Included in the study were 18 patients, with a mean age  $\pm$  SD of  $44.7 \pm 11.1$  years, there were 13 cases of adult para-umbilical hernias and 5 with umbilical hernias, 10 patients treated with PHS and 8 treated by onlay repair with mesh.

Table (1) showed that the mean surgery time was  $54.5 \pm 12.5$  min for PHS repair while it was  $50 \pm 11.7$  min for repair with onlay mesh, this difference was statistically not significant ( $P < .5$ ).

Then mean time for long of stay was  $3 \pm 1.1$  days for PHS repair, while it was  $4.25 \pm 0.6$  days for onlay mesh repair (Table 2). This was significant statistically ( $P < .01$ ).

Testing for pain difference was done using the rating pain scale, for the first day the mean for PHS repair was  $3.5 \pm 0.6$  points, while it was  $4.1 \pm 0.5$  points for onlay mesh, when testing this difference statistically it was found to be non significant. The same difference was got on the second day as the mean for PHS repair was  $2.3 \pm 0.9$  while it was  $2.5 \pm 0.7$  for onlay mesh technique. On the other hand it was significant on the seventh day as the P value was  $< .05$  (Table 3).

Table 1: Mean Operative Time (MOT)

Repair	No.	MOT	Statitstics
PHS	10	$54.4 \pm 12.5$ min	$\dagger = 0.7$
Onlay mesh	8	$50 \pm 11.7$ min	$P < .5$ NS

Table 2: Mean Long of Stay

Repair	LOS	Statistics
PHS	$3 \pm 1.1$ days	$\dagger = 3.2$
Onlay mesh	$4.25 \pm 0.6$ days	$P < .01$ S

Table 3: Mean Rating Pain Scale

Repair	1 <sup>st</sup> day	2 <sup>nd</sup> day	7 <sup>th</sup> day
PHS	$3.5 \pm 0.6$	$2.3 \pm 0.9$	$0.6 \pm 0.6$
Onlay mesh	$4.1 \pm 0.5$	$2.5 \pm 0.7$	$1.2 \pm 0.6$
Statictics	$\dagger = 1$ $P < .5$ NS	$\dagger = 0.6$ $P > .5$ NS	$\dagger = 2.2$ $P < .05$ S

The use of analgesic tablets were recorded in table 4, the mean for PHS repair was  $4.9 \pm 1.6$  tablets, while it was  $11.1 \pm 3.5$  tablets for onlay mesh, this difference was highly significant ( $P < .001$ ) (Table 4).

The post operative complications (Table 5) was one patient with seroma, another with wound infection in the

PHS repaired patient, while no complication in the onlay mesh group of patients.

The mean time for return to work was  $18.4 \pm 2.7$  days for PHS patients, while it was  $21.5 \pm 2.8$  days for onlay mesh group of patients. This showed significant difference statistically ( $P < .02$ ).

Table 4: Mean Analgesic Tablets Intake (ATI)

Repair	ATI	Statistics
PHS	$4.9 \pm 1.6$ tab	$\dagger = 5.1$
Onlay mesh	$11.1 \pm 3.5$ tab	$P < .001$ HS

Table 5: Post-Operative Complications

Repair	Seroma	Hematoma	Wound Infection
PHS	1	-	1
Onlay mesh	-	-	-

Table 6: Mean Time of Return to work (ROW)

Repair	ROW	Statistics
PHS	$18.4 \pm 2.7$ days	$\dagger = 2.5833$
Onlay mesh	$21.5 \pm 2.8$ days	$P < .02$ S

## Discussion

Umbilical hernia defects are not uncommon among adults and are believed to be an acquired disease in more than 90% of cases. Predisposing factors include extreme obesity, multiparity, ascites, and large abdominal tumors [3]. Many surgical techniques have been described for this surgical disease. Open repair of umbilical hernia is considered that standard procedure by most surgeons. The conventional Mayo technique is still one of the most often preferred surgical techniques in hospitals all over the world [10]. However, over the years, the technique has appeared to lose its status owing to observations that both recurrences and wound complications occur at significant rates. On the other hand, the use of mesh materials for the repair of umbilical hernia has been shown to reduce the recurrence rate dramatically [11]. Likewise, the PHS was produced originally for inguinal hernia repair and has been used successfully for this purpose [12]. This 3-in-1 design, especially the connector, makes it ideal for umbilical hernia repair. Basically, it is a combination of 3 techniques, such as

Stoppa-plug-onlay mesh repair, that seems to offer an advantage in protecting against recurrence [13].

Our mean operative time for PHS was  $54.5 \pm 12.5$  min while that for onlay mesh repair was  $50 \pm 11.7$  min with no significant difference statistically. Perrakis et al. [14] recorded median operating time of 35 min (range 28-40), both times ours and their showed a comparable time to that of ours recorded for onlay mesh. Polat et al. [15] had  $40.5 \pm 9.6$  min for PHS and  $56.6 \pm 11.1$  for onlay mesh. This goes hand and hand with our mean time for onlay repair with mesh, all of these showed no significant difference between PHS and onlay repair with mesh.

One of the most important points in any surgical procedures is the LOS, from the economic point of view the less LOS in our study for PHS was  $3 \pm 1.1$  days while that for onlay mesh repair was  $4.25 \pm 0.6$  days with significant difference statistically. The same was by Polat et al. [15] who recorded  $3.3 \pm 1.1$  days for PHS and  $5.2 \pm 1.7$  for onlay repair with mesh. This little significant reduction in the LOS in favour with PHS despite its more expenses.

The mean difference for rating pain scale was not significant in the first and second days but it was so, in the seventh day favouring the use of PHS. Polat et al. [15] found that the comparison was significant in first, second and seventh days. The same was also recorded by Lau et al. [1]. This is because the onlay repair with mesh requires an excessive dissection of soft tissue and suturing, which increase post operative pain, on the other hand PHS technique is in need for less dissection and few interrupted sutures are necessary on the anterior rectus sheath. It is to be expected that PHS patients may feel less post operative pain because of less dissection and suturing.

Post operative analgesia with its side effects may affect by an indirect pass the morbidity of any surgical interference. The PHS showed a highly significant ( $P < .001$ ) reduction in the use of post operative analgesia reducing both the cost and the side effects of NSAID, adding again a point in favour to the use of PHS.

Post operative complications in the form of seroma hematoma and wound infection were more in PHS as there were one seroma and one wound infection but were mild and respond well to conservative treatment without prolongation of LOS. The same was observed by Paajanan and Laine [16] who recorded minor wound complications. The macro porous structure of the meshes of polypropylene, with pores of diameter larger than 70 microns, allows contact among bacteria, which measures one micron in diameter, and the cells of the immune system granulocytes and macrophages, with a diameter of 15.20 microns, allowing the recovery from infections and determining a high resistance rate to infection [17].

When to return to work? Especially when dealing with patients under the cover of insurance. It was found in the current study because of significant reduction in feeling pains; PHS patients went back to work earlier than those with onlay mesh repair ( $P < .02$ ). This is also mentioned by Polat et al. [15] ( $P < .05$ ). PHS™ has the lowest recurrence rate of 0%. The investigated patient group was small compared to the other mesh groups, but like other studies specific for PHS™ repair, a 0% recurrence rate was reported [13]. In this review, no results were reported for postoperative pain in the PHS™ group. In other series, patients reported no postoperative pain after PHS™ repair for umbilical or epigastric hernias [14].

Jeroen et al. stated that the recurrence rate was lowest in the PHS™ and Parietex™ groups (0.0 %), followed by the flat and/or plug polypropylene group (1.7 %). The flat ePTFE and Ventralix™ groups showed higher recurrence rates of 2.5 and 3.4 %, respectively [15].

There is a little debate on how to insert the underlay patch, in the current study like in others [16 - 20] it was inserted and spread in its place without any fixation, only Khera and Berstock [21] recommended four corner suturing of the underlay patch under vision and then through the full thickness of the abdominal wall layers to ensure a flat underlay mesh, but this not supported by any disadvantage to the current non fixation technique which was feasible with minimal complications. It is to be concluded that PHS repair for adult umbilical is associated with minimal post operative pain, requiring less use of analgesics, and early return to work. This repair may provide a further safeguard against recurrence. It is a valid choice comparable to the other common techniques.

## References

1. Lau H, Patil NG. Umbilical hernia in adults. *Surg Endosc* 2003; 17: 2016 - 20.
2. Perrakis E, Velimezis G, Vezakis A, et al. A new tension-free technique for the repair of umbilical hernia, using the Prolene hernia system – early result from 48 cases. *Hernia* 2003; 7: 178 - 80.
3. Arroya A, Garcia P, Perez F, et al. Randomized clinical trial comparing suture and mesh repair of umbilical hernia in adults. *Br J Surg* 2001; 88: 1321 - 3.
4. Wright BE, Beckerman J, Cohen M, et al. Is laparoscopic umbilical hernia repair with mesh a reasonable alternative to conventional repair? *Am J surg* 2002; 184: 505 - 9.
5. Sebastian AA, Perez F, Serrano P, et al. Is prosthetic umbilical hernia repair bound to replace primary hernioplasty in the adult patient? *Hernia* 2002; 6: 175 - 7.
6. Licheris, Erdas E, Martinasco L, et al. Treatment of inguinal hernia with PHS. *Chir Ital*; (2004); 56 (1): 127 – 34.
7. Milic DJ and Pejic MA.: Tension free procedures in the surgical treatment of groin hernia. *Srp Arch Celok Lek*; (2003); 131 (1-2): 82 – 91.
8. Chandiramani VA, Katara AW, Pandya M, et al.: PHS in the tension free repair of primary inguinal hernias. *Ind J. Surg*; (2003); 65 (6): 488 – 491.
9. Swinscow TDV and Campbell MJ.: *Statistics at square one*. BMJ Publishing group, Plymouth, Latimer Tenda Company Ltd.; (1996); Pp-1-138<sup>th</sup> ed.
10. Granase J, Valaulikar G, Khan M. et al. Ruptured umbilical hernia in a case of alcoholic cirrhosis with massive ascites. *Am Surg* 2002; 68: 733 - 4.
11. Menon Vs. Brown TH. Umbilical hernia in adults; day case local anesthetic repair. *J. Postgrad Med* 2003; 49: 132 - 3.

12. Kingsnorth AN, Wright D, Porter CS, et al. Prolene hernia System compared with Lichtensein patch: a randomized double blind study of short-term and medium-term outcomes in primary inguinal hernia repair. *Hernia* 2002; 6: 113 - 9.
13. Del Poza M, Marin P. Three dimensional mesh for ventral hernias: a new technique for an old problem. *Hernia* 2003; 7: 197 - 201.
14. Dabic D, Cerovic S, Azanjac B, Maric B, Kostic I. Prolene hernia system, ultrapro hernia system and 3D patch devices in the treatment of inguinal, femoral, umbilical and small incisional hernias in outpatient surgery. *Acta Chir Jugosl* 2010, 57(2): 49 – 54.
15. Jeroen E. H. Ponten & Irene Thomassen & Simon W. Nienhuijs. A Collective Review on Mesh-Based Repair of Umbilical and Epigastric Hernias Received: 10 July 2012 /Accepted: 17 April 2013 # Association of Surgeons of India 2013 *Indian J Surg* DOI 10.1007/s12262-013-0920-6.
16. Perrakis E, Velimezis G, Vezakis A, et al.: Tension less repair for umbilical hernia. *Hernia* 2004; 8(3): 203 - 7.
17. Polat C, Dervisoglu A, Senyurek G, et al.: Umbilical hernia repair with PHS – *AJS*, 2005; 190: 61 - 64.
18. Paajanan H. and Laime H.: Operative treatment of massive ventral hernia. *Hernia* 2004; 9(1): 62 - 7.
19. D'Ambrosior, Capassol, Sgueglia S, et al.: The mesh of polypropylene in emergency surgery for strangulated hernias. *Ann Ital Chir*, 2004; 75(5): 569 - 73.
20. Awadss, Bruckner B, and Fagan SP.: Transperitoneal new of PHS. *Int Surg*, 2005; 90(3): 63 - 6.
21. Khera G. and Berstock DA. Incisional, epigastric, and umbilical hernia using PHS. *Hernia* 2006; 10(4): 367 - 9.

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