

Comparative Study of Various Surgical Techniques (Anatomical Repair, On-Lay Mesh Plasty, Ultra Pro Hernia System) of Umbilical Hernia Repair

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How to cite this article:

Nishith A Chaudhary, Rajan B Somani, Sameer M Shah, et al. Comparative Study of Various Surgical Techniques (Anatomical Repair, On-Lay Mesh Plasty, Ultra Pro Hernia System) of Umbilical Hernia Repair. *New Indian J Surg.* 2020;11(2):219-223.

Abstract

Context: Umbilical hernia is treated by conventional anatomical suture method, mesh and suture repair. Ultra Pro-hernia System is recently introduced for umbilical hernia treatment. Present study was aimed to compare all three methods in treatment of umbilical hernia.

Aims: In this study we aimed to investigate whether use of a UHS was better in reducing recurrence, postoperative pain compared with suture repair and on-lay mesh repair for umbilical hernias.

Settings and Design: Prospective randomized clinical trial

Methods and Material: Sixty consecutive patients diagnosed with a primary umbilical hernia were enrolled for the study. They were randomized and underwent elective repair of umbilical hernia using the UHS, anatomical repair, or on-lay repair with mesh. Data for the time required for the surgical repair methods, length of hospital stay, postoperative pain, analgesic necessity, and return to work, and early and late complications were recorded, and compared with respect to the repair procedure.

Statistical Analysis used: All data are compared by ANOVA followed by post hoc Analysis either tukey

method for parametric or kruskal -Wallis.

Results: The mean operating time, VAS score, were higher in the anatomical repair and on-lay mesh method as compare to UHS. Patient in UHS have significant less requirement of analgesics, less hospital stay and less recurrence as compared to anatomical repair and on-lay mesh repair.

Conclusions: UHS have better advantage in terms of less post-operative pain, low rate of recurrence, less hospital stay and early return to normal activity over the traditional anatomical method and on-lay repair with mesh.

Keywords: Ultrapro Hernia System; Umbilical hernia; Anatomical repair; On-lay mesh repair.

Introduction

Hernia is protrusion of a viscus or a part of it through the abdominal wall and in Umbilical hernia abdominal contents are protruded in umbilical cord or centre of a congenital weak umbilical scar or through a defect adjacent to the umbilicus. Umbilical hernia is defined as a midline abdominal wall defect around 3 cm above to 3 cm below the umbilicus, and is a common diagnosis in adults, with a global prevalence of 2%.¹

There is a high tendency for incarceration, strangulation, and emergency repair is often necessary for these types of hernias.² A literature review search suggested that no firm consensus currently exists on the best technique for primary repair of these hernias.³ The recurrence rates after

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Received on 26.12.2019, Accepted on 28.01.2020

tissue repair are variable, with reports ranging from 15 to 40%,⁴ while the use of prosthetic material for open umbilical hernia repair had reduce the recurrence rates.³

Mesh repair, preaponeurotic (onlay), retromuscular or preperitoneal (sublay) and intra-abdominal (underlay) placement or even combinations have been described with acceptable results.⁵ This study was designed to study the different techniques of repair of umbilical hernias with special emphasis on Ultrapro hernia System (UHS) and onlay mesh repair and their outcome in terms of operative time, ease of procedure, hospital stay, complications and recurrence.

Materials and Methods

This prospective study was conducted from October 2016 to august 2018 after getting clearance from Institutional Review Board and included 60 adult patients with primary uncomplicated umbilical or paraumbilical hernias.

Patients of 18–64 year age with primary umbilical hernia with a diameter of 1–4 cm were included in the study. Informed and written consent for Anesthesia and Surgery was taken from each patient in their local language. Exclusion criteria were recurrent umbilical hernia, incarcerated umbilical hernia, incisional hernia or epigastric hernia, an American Society of Anesthesiologists (ASA) classification higher than ASA III, or one or more of the following diseases in their medical history: midline laparotomy, laparoscopy with an umbilical entrance port, ascites, peritoneal dialysis, or liver cirrhosis.

Total 60 patients were randomized into 3 groups using computer generated random numbers in sealed envelopes numbered serially to ensure concealed allocation of patients.

Procedure

Suture repair of the umbilical defect consisted of adaptation of the fascia in the midline by either interrupted or continuous, non-absorbable, monofilament, polypropylene sutures of thickness 0/0 (monofilament Prolene suture).

Mesh repair was done with a flat polypropylene mesh (Prolene polypropylene mesh) placed in the preperitoneal plane. Fixation of the mesh was achieved using 0/0 individual, non-absorbable, monofilament sutures (Prolene).

The overlap of the mesh had to be at least 3 cm in each direction of the circular mesh. If the surgeon had to enlarge the umbilical defect during the operation to place the mesh in the preperitoneal plane, this information was recorded in the case record form.

To protect the damage to viscera, it was possible to place the remains of the hernia sac between the viscera and the mesh. The fascia defect was closed over the mesh by sutures when this was possible in a tension-free manner to protect the mesh from contact with the skin. The use of drains was permitted. Closure of the subcutaneous tissue and skin could be achieved using absorbable suture such as 2'0 polyglactin.

UHS (Ultrapro hernia system) It has three points of protection with an onlay patch that cover and protect, a connector that virtually eliminates migration, and the underlay patch that provides posterior support. The onlay patch, connector, and underlay patch of UHS are manufactured from approximately equal parts of absorbable poliglecaprone monofilament fiber and nonabsorbable polypropylene monofilament fiber. After making space between peritoneum and abdominal sheath, UHS mesh lower fold place between peritoneum and abdominal sheath and spread mesh. Then upper fold of mesh spread over fascia and mesh sutured with polypropylene. Ensure adequate haemostasis.

The placement of 'subcutaneous stitches' is optional, but in large patients they can be used to close the potential space between sheath and skin. If placed, use an absorbable suture such as 2'0 polyglactin. Securing the umbilicus to the sheath is another optional step. Skin closure is with an ethilon 2'0 or 3'0 suture and kept a negative drain.

Statistical Analyzis

The chi-square, Mann-Whitney U, and Kruskal-Wallis tests were used for statistical analyzes.

Results

Total 60 patients were divided in 3 groups and operated for anatomical repair (Group A), On-lay mesh plasty (Group B), UHS (Group C). Mean age group of all three groups were compared and all were non-significant (means all groups were comparable) in terms of demographic data and disease characteristics as shown in (Table 1).

Table 1: Demographic and disease characteristics of study groups

	Group 1 (Anatomical repair)	Group 2 (On-lay mesh plasty)	Group 3 (Ultra pro hernia system)	p-value
Age (Mean ± SEM)	51.8 ± 0.76	54.5 ± 1.01	53.75 ± 0.87	0.07
Gender (M/F)	15/5	16/4	14/6	0.08
Predisposing Risk factors present (Number of patient)	8	7	8	0.06
Diameter of Hernia				
1-2 cm	14	15	15	0.68
3-5 cm	6	5	5	

Data were compared by AwwNOVA and post hoc test by Tukey or kruskal-wallis method.

In Group A the mean operative time for surgery was (38 ± 6.7 min) less than the on-lay mesh plasty which was significant ($p < 0.05$) but not significant with UHS (Table 2). The mean length of hospital stay was significantly longer in the onlay repair with mesh group as compare to anatomical repair ($p < 0.05$). No statistically significant difference was detected between the UHS group and Anatomical repair group. According to the VAS, there were no statistically significant differences between the groups on the first day, but on the second and on the seventh days the patients in the UHS group described minimum pain that was statistically

significant ($p < 0.05$). The mean analgesic intake in the Anatomical repair, onlay repair and UHS, groups were 6.4 ± 1.3 , 8.3 ± 2.1 , and 5.2 ± 1.5 tablets, respectively. Compared to the other groups, the need for analgesics was significantly less in the UHS group ($p < 0.05$). The development of postoperative complications such as seroma haematoma, wound infection, and recurrence was similar among the all procedures (Table 3). The patients were followed-up for a period of 12 months. Two recurrence (4%) was encountered in Group A and none in Group B and C (Table 2).

Table 2: Comparison of outcome parameters among the study groups

	Group 1 (Anatomical repair)	Group 2 (On-lay mesh plasty)	Group - 3 (Ultra pro hernia system)	p-value
Duration of Surgery (Min.)	38 ± 6.7	54 ± 9.8*	45 ± 8.6	<0.05
VAS score				
1 st Day	30.12 ± 8.2	36.2 ± 5.2	23.98 ± 8.7	>0.05
2 nd Day	16.41 ± 6.2	21.6 ± 6.5	11.37 ± 4.8 [#]	<0.05
7 th Day	4.5 ± 2.6	10.2 ± 2.8	1.89 ± 0.86 [#]	<0.05
Hospital Stay	3.4 ± 1.1	4.9 ± 1.3	3.3 ± 1.4*	>0.05
Analgesic Intake (Tablets)	6.4 ± 1.3	8.3 ± 2.1	5.2 ± 1.5*	<0.05
Return to work (Days)	10.6 ± 2.1	13.45 ± 1.8	9.23 ± 2.4	<0.05*
Recurrence	2	0	0	>0.05

* $p < 0.05$, as compared with anatomical repair.

[#] $p < 0.05$ as compared to On-lay mesh plasty. Data were compared by ANOVA and post hoc test by Tukey or kruskal-wallis method.

Table 3: Complication among the study groups

Complications	Group 1 (Anatomical repair)	Group 2 (On-lay mesh plasty)	Group 3 (Ultra pro hernia system)
Seroma	1	1	0
Hematoma	0	1	1
Wound Infection	1	1	1
Other	0	0	0

Data were compared by ANOVA and post hoc test by Tukey or kruskal-wallis method

Discussion

Umbilical hernia in adult population is relatively common and it is acquired defect in around 90

percent cases with high chances in fifth and sixth decades of life.⁶ Many surgical techniques have been suggested for this surgical disease. Open repair of umbilical hernia is considered the preferred

procedure by most of surgeons. The conventional Anatomical repair technique is still one of the most often preferred surgical technique in hospitals all over the world.^{7,8} Other side, due to other complications like wound infection and recurrence, this technique loses its place. After introduction of mesh materials for repair of umbilical hernia has been shown to reduce recurrence rate and also decrease in infection like complications.⁹⁻¹¹ UHS is 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.^{12,13}

The present study suggests that mean VAS score of day 1 is not significant in all groups but at day 2, day 7 mean VAS score for UHS is less than anatomical repair, on-lay mesh plasty ($p < 0.05$). Cafer Polat et al., suggest the same finding that VAS score of onlay and anatomical repair is higher than the UHS and PHS (Prolene Hernia System). Undue tension on the abdominal wall accounts for the increased postoperative pain.⁷ The on-lay repair with mesh requires an excessive dissection of soft tissue and suturing, which augments postoperative pain. In the UHS technique, less dissection and few interrupted sutures are necessary on the anterior rectus sheath. This explains that patients in the UHS group may feel less postoperative pain because of less dissection and suturing and less consumption of analgesics.

Compared to the UHS, the onlay repair with mesh technique, anatomical repair conferred significantly higher postoperative pain, longer surgery time, and longer hospital stay and time to return to work.

Several studies suggest that there is a high rate of recurrence after the Anatomical repair, ranging from 10% to 30% in many studies.^{2,14,15} Due to tension free techniques with mesh materials, these high recurrence rates have been reduced to minimum. Many surgeons consider prosthetic mesh repair as the gold standard in the treatment of midline aponeurotic defects, including umbilical hernias.¹⁶⁻¹⁸ In present study, although it was not statistically significant, we diagnosed 2 recurrences in the anatomical repair group. No recurrences were recorded among patients who underwent prosthetic mesh repair (UHS and on-lay mesh).

UHS have better advantage in terms of less postoperative pain, low rate of recurrence, less hospital stay and early return to normal activity over the traditional anatomical method and on-lay repair with mesh.

Key Message

The UHS seemed to be useful for umbilical hernia repairs against anatomical repair and on-lay mesh plasty as it caused minimal postoperative pain and less analgesic necessity, less recurrence.

Conclusion

The UHS seemed to be useful for umbilical hernia repairs against anatomical repair and on-lay mesh plasty as it caused minimal postoperative pain and less analgesic necessity, less recurrence.

References

1. Muysoms FE, Miserez M, Berrevoet F, et al. Classification of primary and incisional abdominal wall hernias. *Hernia* 2009;13(4):407-14.
2. Muschaweck U. Umbilical and epigastric hernia repair. *Surg Clin North Am*. 2003;83(5):1207-21.
3. Solomon TA, Wigneswaran P, Chaudry MA, et al. A retrospective audit comparing outcomes of open versus laparoscopic repair of umbilical/paraumbilical hernias. *Surg Endosc* 2010;24(12):3109-12.
4. Aslani N, Brown CJ. Does mesh offers an advantage over tissue in the open repair of umbilical hernias? A systematic review and meta-Analysis. *Hernia* 2010;14(5):455-62.
5. Berrevoet F, D'Hont F, Rogiers X, et al. Open intra-peritoneal versus retromuscular mesh repair for umbilical hernias less than 3 cm diameter. *Am J Surg* 2011;201(1):85-90.
6. Morgan WW, White JJ, Stumbaugh S, et al. Prophylactic umbilical hernia repair in childhood to prevent adult incarceration. *Surg Clin North Am* 1970;50(4):839-45.
7. Nguyen NT, Lee SL, Mayer KL, et al. Laparoscopic umbilical herniorrhaphy. *J Laparoendosc Adv Surg Tech A* 2000;10:151-3.
8. Granase J, Valaulikar G, Khan M, et al. Ruptured umbilical hernia in a case of alcoholic cirrhosis with massive ascites. *Am Surg* 2002;68(8):733-4.
9. Celdran A, Bazire P, Garcia-Urena MA, et al. Hernioplasty: A tension-free repair for umbilical hernia. *Br J Surg* 1995;82(3):371-2.
10. Menon VS, Brown TH. Umbilical hernia in adults: day case local Anesthetic repair. *J Postgrad Med* 2003;49(2):132-3.
11. 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.
12. 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(4):178-80.
 13. Del Poza M, Marin P. Three dimensional mesh for ventral hernias: a new technique for an old problem. *Hernia* 2003;7(4):197-201.
 14. Lau H, Patil NG. Umbilical hernia in adults. *Surg Endosc* 2003;17(12):2016-20.
 15. 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(10):1321-3.
 16. Bencini L, Sanchez LJ, Scatizzi M, *et al.* Laparoscopic treatment of ventral hernias. Prospective evaluation. *Surg Laparosc Endosc Percutan Tech* 2003;13(1):16-19.
 17. Courtney CA, Lee AC, Wilson C, *et al.* Ventral hernia repair: A study of current practice. *Hernia* 2003;7(1):44-6.
 18. Sebastian AA, Perez F, Serrano P, *et al.* Is prosthetic umbilical hernia repair bound to replace primary herniorrhaphy in the adult patient? *Hernia* 2002;6(4):175-7.
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