ORIGINAL ARTICLE

Analysis of Acute Postoperative Pain in Patients undergoing Transabdominal Preperitoneal (TAPP) Repair of Inguinal Hernia in Manipal Teaching Hospital.

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ABSTRACT

Introduction: Laparoscopic inguinal hernia repair in adults require the use of prosthetic material. We aimed to investigate the acute postoperative pain in patients who underwent transabdominal preperitoneal inguinal hernia repair using heavy or light weight polypropylene mesh.

Methods: This observational, analytical study was conducted in172 adult patients, aged 18-80 years, who underwent transabdominal preperitoneal inguinal hernia repair from January 2017 - October 2019. The patients were divided into two groups as HWM group (heavyweight polypropylene mesh), n=81 and LWM group (light weight polypropylene mesh) n=91. The patients in both the groups were compared in terms of acute postoperative pain at 24 and 48 hours using visual analogue scale (VAS) score.

Results: The visual analogue scale (VAS) score of HWM group and LWM group at 24 hours was 5.42 ± 1.25 and 4.46 ± 1.61 respectively (p=0.00). The VAS score at 48 hours was 3.44 ± 1.07 and 2.74 ± 1.27 for HWM and LWM group respectively (p=0.00).

Conclusions: The post-operative pain at 24 and 48 hours following transabdominal preperitoneal inguinal hernia repair using light weight polypropylene mesh was less as compared to the patients whose hernia were repaired using heavy weight polypropylene mesh.

Key words: *Hernia, inguinal; mesh; pain; polypropylene.*

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INTRODUCTION

The repair of inguinal hernias is one of the most commonly performed general surgical procedures. The development of polypropylene prosthetics revolutionized surgery for the repair of inguinal hernias.

Surprisingly, little research has been performed to investigate the acute postoperative pain in patients whose hernia has been repaired using heavy or light weight polypropylene mesh. Literature has mainly focused on chronic pain associated with the use of prosthetics. The argument forwarded being higher content of polypropylene would incite intense inflammation which would result in chronic pain. [1]

Thus, we aimed to find out whether the content of polypropylene (heavy vs lightweight mesh) is associated with difference in the pain scale or not in the immediate postoperative period at 24 and 48 hours.

METHODS

This observational, analytical study was conducted after approval from institutional review board, with protocol approval number MEMG/IRC/282/GA. The study was conducted in the department of surgery of Manipal Teaching Hospital. A total of 172 adult patients, ASA PS I and II, aged 18-80 years, who underwent transabdominal preperitoneal (TAPP) inguinal hernia repair (TAPP) from January 2017 - October 2019 were included. The sample size was calculated using statistical software G Power 3.1.9.4 for comparing mean difference with power of 80%, at alpha value of 0.05 with medium effect size of 0.5 indicated 128 cases were required. However we have conducted this study in 172 cases. Depending on the type of mesh used; patients were divided into two groups as HWM group (heavyweight polypropylene mesh, n=81) and LWM group (light weight polypropylene mesh, n=91). In HWM group polypropylene mesh of 10X15 cm; Surgipro monofilament, Covidien or 10.3 X15.7cm 3D mesh; 3D Bard, were used. In LWM group polypropylene mesh of 10x15 cm ; Parietene lightweight mesh, Covidien was used.

Surgical technique: The patient's position for TAAP was supine with both arms tucked by the side of the body. For the first trocar, an incision of one cm was given transversely superior to the umbilicus. Pneumoperitoneum was created with help of veress needle and 10mm trocar was placed blindly. Hasson technique was used for entrance into the peritoneal cavity, only if intra-abdominal adhesions were suspected from previous surgery.After initiation of pneumoperitoneum, intra-abdominal pressure was maintained at 12- 15mm of Hg. The patients were then placed in trendelenburg position with of 10°-20° tilt towards the contralateral side of hernia to expose the inguinal area. The other two trocars of five mm were placed under vision at the level of umbilicus at midclavicular line. A 30°telescope was used to inspect the inguinal region for hernia and to look for any occult hernias. The peritoneal flap was created

approximately four cm above the superior edge of defect, extending from anterior superior iliac spine to median umbilical ligament. Peritoneal flap was created using blunt and sharp dissection. Lateral, medial and central dissection were completed by skeletonizing the cord structures. Direct sacs and small indirect sacs were fully reduced. Larger indirect sacs were partially dissected and freed from the cord structures posteriorly and then circumcised. The distal part of a large sac was left in-situ. The anatomy was then defined and the posterior flap fully developed, the dissection going at least five cm posterior to the internal ring. Medially the dissection was carried to the symphysis pubis. A selected mesh was then fashioned and inserted. The medial border of the mesh was placed adjacent to the symphysis pubis and the posterior part was placed well behind the internal ring. When the mesh was satisfactorily placed, it was tacked in place, tacker being applied to the pubic bone and Cooper's ligament. Further tacks were placed into the muscle layers anteriorly but none into the ileo-pubic tract or posterior to it. If the hernia were bilateral, the same procedure was performed on the contra-lateral side, a second mesh was used. The peritoneum was apposed back with the same tacks and the operation was completed by closing 10mm port with port Vicryl and placing staples to the skin. All patients were given injection Paracetamol one gm. intraoperative before shifting to post-operative ward. Post-operative analgesia was provided with injection paracetamol one gm iv tds and injection ketorolac 30 mg iv tds until first post-operative day after which patients were started on oral medication, tablet ketorolac 10mg tds for minimum of five days.

The patients in both the groups were evaluated in terms of acute postoperative pain based on 10 point visual analogue score (VAS) scale, where zero corresponded to no pain and 10 corresponded to the worst imaginable pain. VAS score was recorded at 24 and 48 hours post-operative at rest. It is a common practice in our department to record post-operative pain in patients undergoing laparoscopic surgery using VAS scale as pain is now considered as a sixth vital sign. The data were retrieved from the medical record department of the hospital.

Statistical analysis was done using SPSS version 21.0. Categorical variables were expressed as number/percentages and analyzed using chi square or fischer's exact test whichever was appropriate. Quantitative variables were expressed as mean ± SD and analyzed using independent t test. P value ≤ 0.05 was considered statistically significant.

RESULTS

The pain in the post-operative period was less in light weight mesh group (LWM) as compared to heavy weight mesh group (HWM) (Table 1).

Table 1. Acute post-operative pain.

VAS Score	HWM (n=81)	LWM (n=91)	P value
At 24 hours	5.42 ± 1.25	4.46 ± 1.61	0.00
At 48 hours	3.44 ± 1.07	2.74 ± 1.27	0.00

Data presented as mean ± SD and analyzed by independent t test, VAS: visual analogue scale, HWM: heavy weight mesh, LWM: light weight mesh.

On evaluation of pain in relation to age, we found it was significant in the age groups 18-35 and 51-65 at 24 and 48 hours (Table 2).

Table 2. Evaluation of VAS score with types of mesh used at different age groups.

Age group	Mesh used	VAS at 24 hours	P value	VAS at 48 hours	P value
18-35	HWM 30	5.30 ± 1.46	0.02	3.27 ± 1.12	0.02
	LWM 24	4.38 ± 1.49		2.58 ± 1.01	
36-50	HWM 17	5.59 ± 1.12	0.59	3.65 ± 1.15	0.71
	LWM 21	5.29 ± 2.07		3.48 ± 1.66	
51-65	HWM 28	5.57 ± 1.39	0.00	3.61 ± 1.03	0.00
	LWM 27	4.11 ± 1.47		2.52 ± 1.18	
66-80	HWM 6	4.83 ± 1.32	0.21	3 ± 0.89	0.18
	LWM 19	4.16 ± 1.06		2.42 ± 0.90	

Data presented as mean ± SD or numbers, analyzed by independent t test, VAS: visual analogue scale, HWM: heavy weight mesh, LWM: light weight mesh.

We also found that there was significant pain in patients whose bilateral hernias were repaired using heavy weight mesh only at 24 hours whereas in patients where light weight mesh was used, there was no difference in VAS score whether unilateral or bilateral hernias were repaired as shown in Table 3.

Table 3. VAS score when unilateral or bilateral hernias were repaired with types of mesh.

Mesh used	Number	VAS at 24 hours	P value	VAS at 48 hours	P value
LWM	U/L 75	4.49 ± 1.67	0.68	2.76 ± 1.31	0.70
	B/L 16	4.31 ± 1.35		2.63 ± 1.08	
HWM	U/L 68	5.29 ± 1.32	0.05	3.35 ± 1.06	0.07
	B/L 13	6.08 ± 1.38		3.92 ± 1.03	

Data presented as mean ± SD and number, analyzed by independent t test, U/L: unilateral, B/L bilateral.

The demographic variables of the patients enrolled in the study are presented in Table 4.

Table 4. Demographic variables.

Variables	Overall value	HWM (n=81)	LWM (n=91)	P value
Age	46.81 ± 17.16	43.64 ± 17.18	49.64 ± 16.73	0.22
Gender M/F	160/12	77/4	83/8	0.32

Data presented as mean ± SD and number, analyzed by independent t test and chi square test, ±

DISCUSSION

A tension free operation with non-absorbable mesh is the current standard technique for inguinal hernia surgery.[2] Irrespective of type of surgery and type of mesh used for repair of inguinal hernia, complications like pain significantly affects the daily activities of individuals. We used heavy and light weight polypropylene monofilament, non-absorbable mesh for repair of inguinal hernia in our study. Meshes less than 40g/m^2 are referred to as light weight mesh and more than 80g/m^2 as heavy weight mesh.[3] Heavier the mesh, stronger will be the foreign body reaction and it results in intense inflammation, collagen contraction and stiffening. This will cause tissue tension and pain after mesh hernia repair.

Although there is no formal standard classification, Earl and Mark have proposed very large pore: >2000 µm; large pore: 1000–2000 µm; medium pore: 600–1000 µm; small pore: 100–600 µm and microporous (solid) as <100 µm.[4,5] The small pores results in minimum integration and are associated with chronic inflammation. Macroporous meshes that have large pores facilitates entry of macrophages, fibroblasts and collagen fibers that constitute the new

connective tissue, integrate the prosthesis to the organism and prevent colonization of bacteria. Large pores have shown easy infiltration of immunocompetent cells, providing protection from infection with less inflammation. [6]

Over the past two decade, there has been greater emphasis on prevention of acute postoperative pain and potential chronic pain after inguinal hernia repair. The laparoscopic repair with flat, low weight mesh have shown a promising results for reducing pain.[7,8] The European Hernia Society has also identified severe acute postoperative pain as a risk factor for chronic pain. Thus, the purpose of our study was to evaluate acute postoperative pain following trans-abdominal preperitoneal (TAPP) repair of inguinal hernia by using light and heavy weight polypropylene mesh.

We found postoperative pain in light weight mesh (LWM) group was less than that of heavy weight mesh (HWM) group. Our findings are similar to the studies done by Eskandaros MS et al and Shakya et al. [9, 10] Likewise, Gogate AS et al in tension free Liechtenstein repair have compared heavyweight with lightweight mesh and found significantly less pain in recipients of light weight mesh.[11] In the study done by Bahram MAL et al the immediate and early postoperative pain was less in heavy weight mesh when compared to ours.[12] However, our study differs from the study done by Prakash et al in which there was no difference between heavyweight and lightweight mesh used for laparoscopic hernia repair at 24hrs postoperative period but the authors have not defined which scale was used for pain measurement.[13]

There are several other studies with conflicting results. Currie et al have concluded that postoperative pain scores were comparable between lightweight and heavy weight mesh recipients.[14] Likewise, Wu et al also indicated that acute postoperative pain between light weight and heavy weight meshes were equivalent.[15] The randomized controlled trial of Lichtenstein repair of primary inguinal hernia repair by Demetrashvili et al showed no statistically significant difference between light weight and heavy weight mesh groups as for frequency of inguinal pain. [16]Though studies have focused on types of mesh used and association with acute and chronic post-operative pain follow\

ing laparoscopic hernia repair. Most of the studies have not mentioned about the number and type of tacks used to fix the mesh, how meticulous was the dissection performed, to what extent was the cautery used and the experience of the surgeon. All these factors also contribute to post-operative pain. The limitations of this study are we have not considered about the degree of tension, placement of mesh in depth from skin and abdomen, total abdominal fat, muscle thickness which may contribute to post-operative pain.

CONCLUSION

The post-operative pain at 24 and 48 hours following transabdominal preperitoneal inguinal hernia repair using light weight polypropylene mesh was less as compared to the patients whose hernia were repaired using heavy weight polypropylene mesh.

CONFLICT OF INTEREST

None

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None

REFERENCES

1. Cobb WS, Kercher KW, Heniford BT. The argument for lightweight polypropylene mesh in hernia repair. Surgical innovation. 2005 Mar;12(1):63-9.
2. Simons MP, Aufenacker T, Bay-Nielsen M, Bouillot JL, Campanelli G, Conze J, De Lange D, Fortelny R, Heikkinen T, Kingsnorth A, Kukleta J. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. August 2009, Volume 13, Issue 4, pp 343–403.
3. Bailey & Love's Short Practice of Surgery, 27th Edition: the Collector's edition. Publisher: Boca Raton, FL: CRC Press, 2018,1026-27.
4. Earle, D.B.; Mark, L.A. Prosthetic Material in Inguinal Hernia Repair: How Do I Choose? Surg. Clin. N. Am.2008, 88, 179–201.
5. Pourdeyhimi, B.J. Porosity of surgical mesh fabrics: New technology. Biomed. Mater. Res. 1989, 23 (Suppl. A1), 145–152.
6. Zogbi, L. The Use of Biomaterials to Treat Abdominal Hernias. In Biomaterials Applications for Nanomedicine, 1st ed.; Pignatello, R., Ed.; InTech: Rijeka, Croatia, 2008; Volume 18, pp. 359–382.
7. Yunis J. Critical issues in groin hernia management. Surgical technology international. 2009 Apr; 18:119-24.
8. Sajid MS, Kalra L, Parampalli U, Sains PS, Baig MK (2013) A systematic review and meta-analysis evaluating the effectiveness of lightweight mesh against heavyweight mesh in influencing the incidence of chronic groin pain following laparoscopic inguinal hernia repair. Am J Surg 205(6):726–736.
9. Eskandaros MS, Hegab AA. Heavy-weight (prolene) mesh versus light-weight (ultrapro) mesh in laparoscopic transabdominal preperitoneal inguinal hernia repair. Egypt J Surg 2016;35:236-40.

10. Shakya VC, Sood S, Bhattarai BK, Agrawal CS, Adhikary S. Laparoscopic inguinal hernia repair: a prospective evaluation at Eastern Nepal. Pan Afr Med J. 2014;17:241.
11. Gogate AS, et al. Comparison of Heavy- and Light-Weight Composite Mesh in Pain Reduction Among Patients with Inguinal Hernia: A 1-Year Randomized Control Trial. International Journal of Medical Research & Health Sciences, 2017, 6(5): 135-38.
12. Latif Bahram MA. Early and late outcomes of trans-abdominal pre-peritoneal and Lichtenstein repair for inguinal hernia, a comparative study. International Surgery Journal 2017;4:459–64.
13. Prakash P, Bansal VK, Misra MC, Babu D, Sagar R, Krishna A, Kumar S, Rewari V, Subramaniam R. A prospective randomised controlled trial comparing chronic groin pain and quality of life in lightweight versus heavyweight polypropylene mesh in laparoscopic inguinal hernia repair. Journal of minimal access surgery. 2016 Apr;12(2):154.
14. Currie A, Andrew H, Tonsi A, Hurley PR, Taribagil S. Lightweight versus heavyweight mesh in laparoscopic inguinal hernia repair: a meta-analysis. Surgical endoscopy. 2012 Aug 1;26(8):2126-33.
15. Wu F, Zhang X, Liu Y, Cao D, Yu Y, Ma Y. Lightweight mesh versus heavyweight mesh for laparo-endoscopic inguinal hernia repair: a systematic review and meta-analysis. Hernia. 2019 Jul 31:1-9.
16. Demetrashvili Z, Khutsishvili K, Pipia I, Kenchadze G, Ekaladze E. Standard polypropylene mesh vs lightweight mesh for Lichtenstein repair of primary inguinal hernia: a randomized controlled trial. International Journal of Surgery. 2014 Dec 1;12(12):1380-4.