

Early results of comparison of polypropylene mesh and 75% resorbable mesh (monofilament polypropylene and poly-L-lactic acid (PLLA) mesh) for laparoscopic total extraperitoneal (TEP) inguinal hernia repair

 Birol Agca,  Yalin Iscan,  Kemal Memisoglu

¹Departments of General Surgery¹, Fatih Sultan Mehmet Training and Research Hospital, Istanbul, Turkey

ABSTRACT

OBJECTIVE: Laparoscopic totally extraperitoneal (TEP) hernia repair has become increasingly widespread. Faster recovery than conventional open methods shortens the return to work. Polypropylene (PP) mesh is still in use in hernia surgery because it is an inexpensive and easily accessible patch. The post-operative chronic pain and foreign body sensation are the disadvantages of these PP patches. Poly-L-lactic acid and polypropylene (PLLA) was used in our study because of the good biocompatibility and low tissue inflammation response. We compared the early clinical outcomes of PP patch and PLLA patches.

METHODS: Between January 2013 and April 2018, 469 patients with inguinal hernia underwent TEP procedure. Patients were divided into two groups. PP mesh (n=211) in group 1, PLLA mesh (n=258) in group 2. Patients were compared in terms of age, gender, hernia side, ASA scores, duration of operation, pain, time to return to work, sensation of foreign body, seroma and hematoma.

RESULTS: A total of 469 patients were analyzed retrospectively (426 male, 43 female). The mean age was 52.23±13.66 years. The operative times of the patients were 40.92±8.9 minutes in group 1 and 38.82±8.5 minutes in group 2 (P<0.05). The time to return to work was 10.2±1.47 days in Group 1 and 8.4±1.0 days in Group 2 (P<0.05). Visual Analog Scale (VAS) In group 2, it was lower than in group 2 (P<0.005). In group 2, the feeling of organic body decreased in early and late period (P<0.005). Seroma and hematoma were less in Group 2 than in Group 1 (P<0.005). The mean follow-up period of the patients was 18 (3-63) months, 2 patients in Group 1, 2 patients in Group 2 recurred.

CONCLUSION: The PLLA patch used in the TEP method is thought to be a herniated patch that can be safely used because of its ease of application and less postoperative complication rates and more rapid return to work.

Keywords: Laparoscopic hernia repair; mesh; poly-L-lactic acid.

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Inguinal hernia is seen in 5-7% of the general population and it is one of the most frequently treated illnesses in general surgery [1]. Every year 20 million cases of inguinal hernia are treated around the world and it is truly a critical factor in financial aspect of health services

[2]. Also, providing the patient a certain level of comfort is another important factor in active working group of the population. In the surgery of inguinal hernia there are many different defined techniques from open ones to minimal invasive attempts. Today the best results are



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Correspondence: Dr. Birol AGCA. Genel Cerrahi Bolumu, Fatih Sultan Mehmet Egitim ve Arastirma Hastanesi, Istanbul, Turkey
Phone: +90 533 347 27 24 e-mail: birolagca@yahoo.com

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taken with tension free patched repair. Lichtenstein repair and laparoscopic mesh repair is the most frequently used methods with this technique. Since these techniques are defined, different firms released different materials, different patches from different supplies and differently formed products [3]. Polypropylene (PP) patches are the most frequently preferred products because they are easily and cheaply available and provide enough strength for the technique. However chronic pain and feel of a foreign object is among the adverse effects of this kind of patch after the surgery [4]. It is thought that patch's thickly knitted and porous structure causes intense inflammation, thus creating a tough scar tissue and consequently disrupting the elasticity of abdominal wall, hence causing discomfort for the patient [5]. To prevent these disadvantages different composite patches are produced as an alternative to this patch. Experimental studies showed that patches which are combined with poly-L-lactic acid (PLLA) is a good alternative to non-absorbent patches because of less inflammation response, biocompatible nature and lower relapse potential [6]. In this study we aimed to compare the differences between the use of PP patch and PLLA patch in terms of early period clinic results after a unilateral hernia repair surgery done with the method of laparoscopic total extra peritoneal.

MATERIALS AND METHODS

Between January 2013 and April 2018, 469 unilateral inguinal hernia patients are treated with elective TEP. 22 of them were patients who had open hernia repair before and had relapse. Local ethic committee gave the approval to the study for use of hospital data. Patients treated with TEP were retrospectively documented. Emergency cases and ASA IV patients were excluded from the study. All patients were operated by two expert surgeons in laparoscopic hernia surgery (100 cases/year). Patients who did not experience preoperative complications were discharged after the first day post-surgery. In the first week and 3rd month they were checked in outpatient clinic. In the 3rd month, patients who did not come to their clinic check were reached by phone. On 211 patients, polypropylene patch were used and they were named Group-1. On 258 patient resorbable monofilament polypropylene and poly-L-lactic Acid (4 D Mesh R, Cousine Biotech) were used and they were defined as Group-2. Groups were compared according to their age, sex, side of hernia, ASA scores, duration of surgery, Visual Analogue Scale (VAS) pain scores after first day

and third month of the surgery, time of getting back to work, foreign object feeling on first day and third month, seroma-hematoma. In our study, cost analysis was not performed.

Statistical Analysis

During the evaluation of the findings obtained for the research, IBM SPSS Statistics 22 (IBM SPSS, Turkey) software were used. Study data were evaluated also with Shapiro Wilks test to see if the parameters were normally distributed. During the evaluation process definitive statistical methods (mean, standard deviation, frequency) was used along with Student t test to compare normally distributed parameters between groups, also Mann-Whitney U test was used to compare non-normally distributed parameters between two groups to evaluate quantitative data. During the comparison of qualitative data Chi Square test and Continuity (Yates) Correction was used. Significance was evaluated at the level of $p < 0.05$.

RESULTS

This research was done with the retrospective analysis of 469 cases, 426 males and 43 females, aged between 19 and 94. All patients' average is 52.23 ± 13.66 years. ASA scores are varying between I and III. In 196 of them hernia side was right and 273 of them was left. Duration of surgery took 40.92 ± 8.9 and 38.82 ± 8.5 minutes for Group 1 and Group 2 respectively. Group 2's operation time is shorter than Group 1 and the difference is statistically significant. ($p=0.009$) No significant difference was found between their day of hospitalization. Their times of getting back to work were asked at their third month clinic checks. For old patients and unemployed cases, doing housework comfortably by themselves and taking walks outside is regarded as getting back to work. In Group 2, it took less time than Group 1 and it is statistically significant ($p < 0.005$) (Table 1). In VAS scores, Group 2's data is lower than Group 1 at first day after surgery and third month after it and it is statistically significant ($p < 0.005$). Patients answered the question "Do you feel a foreign object in the operated inguinal region?" as yes or no. In Group 2, feel of a foreign object was less in both early and late period and difference was statistically less (first day and third month respectively: $p < 0.005$ and $p < 0.005$). Seroma or bleeding, sore or swelling in operated area or ecchymosis was checked at the first day and third month after the surgery. Asymptomatic cases

TABLE 1. Characteristics of patients undergoing inguinal hernia repair in groups

	Group 1 (n=211) Mean±SD (median)	Group 2 (n=258) Mean±SD (median)	p
Mean Age (years)	52.45±14.02	52.05±13.38	¹ 0.756
Sex n (%)			
Male	189 (%89.6)	237 (%91.9)	³ 0.393
Female	22 (%10.4)	21 (%8.1)	
Hernia side n (%)			
Right	84 (%39.8)	112 (%43.4)	³ 0.432
Left	127 (%60.2)	146 (%56.6)	

¹Student t Test; ²Mann-Whitney U Test; ³Chi Square test; *p<0.05

TABLE 2. Data of the groups

	Group 1 Mean±SD (median)	Group 2 Mean±SD (median)	p
VAS			
0.month	7.62±0.68 (8)	7.33±0.74 (7)	¹ 0.000*
3.month	2.83±0.62 (3)	2.49±0.67 (2)	¹ 0.000*
Seroma/ hemorrhagen (%)			
0.month	47 (%22.3)	26 (%10.1)	² 0.000*
3.month	16 (%7.6)	6 (%2.3)	³ 0.014*
Foreign body sensationn (%)			
0.month	117 (%55.5)	67 (%26)	² 0.000*
3.month	71 (%33.6)	36 (%14)	² 0.000*
Recurrence n (%)	2 (%0.94)	2 (%0.77)	² 0.646

¹Mann-Whitney U Test; ²Chi Square test; ³Continuity (Yates) Correction; *p<0.05

were followed conservatively. This evaluation was done clinically and radiologically. Seromas were cleaned with aspiration. Three patients (one in Group 1 and two in Group 2) were subject to hemostasis and wound site exploration because of hematoma at the first day after surgery. In Group 2 seroma and bleeding lasted shorter than Group 1 at both first day and third month, the difference was statistically significant (p<0.05). The mean follow-up time was 18 months (range 3 to 63 months). During this phase two cases had recurrence in Group 1

(%0.94) and Group 2 (%0.77). It was not statistically significant (p=0.646) (Table 2).

DISCUSSION

In daily practice of general surgery, apart from a few emergency surgery procedures, inguinal hernia surgery is one of the most frequently operated type of surgery. Every year over 20 millions of surgeries were estimated to happen [7, 8]. Various surgery techniques are defined with open and closed methods, despite that it is shown in the literature that not only surgery technique factors into long term results and patient satisfaction [9]. Requirement of using patch in inguinal hernia surgery is not a controversial practice today because it significantly prevents relapse [10]. Existence of chronic pain caused a number of different types patches to be used when long terms results are taken into account and still, there is a search for an ideal patch [3]. Because polypropylene causes advanced inflammation and disrupts patient comfort in long term, completely absorbable composite patches are being discussed [11, 12]. As of today, there are more than 130 patch varieties offered. Essential differences between them are material, weight, pore diameter. Most widely used material is polypropylene patches with polymerized propylene chains. Other types include synthetic polyester polymer material polyethylene terephthalate (PET) and expanded polytetrafluoroethylene (PTFE) and partially absorbable poligle-caprone polypropylene [13]. During our research, we retrospectively scrutinized the clinic results of a partially absorbable patch with poly-L-lactic acid which Yoon SD et al. [6] and Tanaka K et al. [14] showed that it gives good results in inguinal hernia surgery experimentally. In our research, the average age is 52.23±13.66 years and male/female ratio is 90.8% (246/269). This age-gender and ASA distributions shows similarities with a previously done local research [15]. In terms of hernia side, left is more frequent in both groups and all patients although literature says hernia on right side is more widespread [16, 17]. When similar examples to this research in the literature is examined, it can be seen that types of different patches affected the duration of the procedure. However, this effect is attributed the experience of surgical team or heterogeneous nature of patient group. Bringman et al. [18] did a prospective clinic research to compare two different with a sample size of 139 cases and found that duration of operation was significantly different between two types of patches. But this dif-

ference was attributed to the fact that number of cases between two groups were homogeneous and because of the fastest surgeon in the research. Prassas et al. [13] attributed the difference of time to gender distribution between two groups (in males, dissection of spermatic cord structures taken time). In our research, it was found that PLLA used operations significantly lasted shorter. However, because of the retrospective nature of the research, we attribute the difference to heavy use of PP in the first years and more skillful use of PLLA patch after passing the learning curve. It was found that time needed to get back work was shorter in a statistically significant fashion in PLLA patients. We attribute the difference to a smaller feel of a foreign object and a lower pain score. Talha et al. [17] emphasized that less pain shortens time needed to get back to work in a research in which they compare composite Ultrapro™ and non-absorbent 3D Max™, and composite group causes less pain. Choybey et al. [19] emphasized that Ultrapro™ group had less pain and did a faster return to normal activity in a TEP research they did with Prolen™ and Ultrapro™. However in another research where Prolen™ and Vypro II™ were compared and multicenter concluded by saying two different had no effect on time of getting back to work [20].

When VAS results were taken into account, it was found that PLLA group patients had less pain at both first day and third month. We think that patch's thickly knitted and porous structure causes intense inflammation, thus creating a tough scar tissue and consequently disrupting the elasticity of abdominal wall and causes the difference. Similarly, another research comparing non-absorbable PP patch and a partially absorbable patch showed after preperitoneal classic inguinal hernia repair that partially absorbable patch patients had less pain in early and late periods [17]. Polish Hernia Group published another research that randomized 600 cases in 15 centers and showed that partially absorbable light composite mesh caused less pain than heavy-weight polypropylene patch [21]. Another research found no difference between the use of composite patch and PP [18]. When two groups were evaluated in terms of seroma/hematoma, early and late results are statistically less significant in PLL-PP group (First day- 47 (22.3%) vs 26 (10.1%), Third month- 16 (7.6%) vs 6 (2.3%), Group 1 vs Group 2). Bangash A et al. [22] compared composite polypropylene and polypropylene patch in a randomized research and found that PP group had more seroma. In a recent review with big case series concluded

no risk factor in this about patch type [23]. We think that polypropylene's porous and thickly knitted structure causes seroma and hematoma because it serves as a secondary barrier for inflammation. Foreign object feeling is felt more in PP used Group 1 in both early and late period because of quick fibrosis reaction. These findings showed that in PP groups foreign object feel is more as in two other comparative researches that looks into composite and PP patches [17, 24].

CONCLUSION

In laparoscopic inguinal hernia repair, PLLA patch is a safe option for its applicability in short time, because it causes less pain and gets people back to work faster and also less seroma development and foreign object feel but our results should also be supported by randomized controlled research findings.

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