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A Comparison Between Complications of Surgical Repair of Indirect Inguinal Hernia by Lichtenstein and Read-rives Procedure

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Inguinal hernia has high prevalence in the worldwide. Two current methods of surgery are Read-Rives and Lichtenstein. The Read-rives method which is Perry peritoneal makes less weak points. Lichtenstein method is easier and also is sub-Apo neuroses. Studying two mentioned methods due to the duration of surgery and inpatient, recurrent hernia and pain is the aim of this study. 86 patients of inguinal indirect and primary hernia were divided into two equal groups of Read-Rives and Lichtenstein randomly. Duration of surgery and inpatient, recurrent hernia and pain were evaluated 48 hours, one month and three months after intervention according to the VAS scale and recurrent of Hernia between 6 and 12 months. The mean of operative time obtained 51.5 and 45.5 minutes ($p<0.001$), mean of the hospitalization time obtained 1.29 and 1.28 days ($p<0.05$) for RR and LS groups respectively. Pain decreased in the duration of study but reduction of RR group was more significant than the reduction of LS group ($p<0.001$). Recurrence of RR group was less than LS group (1.3 against the 4.7%) but there wasn't significant difference ($p>0.05$). In this minimal study RR method had better performance than LS method in the duration of surgery and pain of patients in three months. Also both methods didn't have significant differences in the time of hospitalization and recurrence of one year for indirect inguinal Hernia.

Key words: Inguinal Hernia, Read-Rives, Lichtenstein, Recurrence, Chronic Pain.

Inguinal hernia is defined as the protrusion of peritoneal with or without stomach content which occurs in the muscular area of anterior abdominal wall near the inguinal canal. The signs of inguinal Hernia are from unsigned to intense paint. The unsigned Hernia is diagnosed accidently or patients notice a protrusion in their groin area, while in the signed issues patients may refer with different complaints such as changes in the bowl and urinary habits and several levels of pain [1]. Inguinal hernia is divided to five categories including unsigned form or the painless hernia, the form with little signs that patients complain for that but those signs don't bother daily works of individuals, and the signed form which have pain while hernia contents are reversible to the

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abdominal cavity by manual manor. The irreversible replacing form which contains hernia sac and returning to the abdominal cavity that is in the acute form that is named incarceration and in the chronic form that is named Accreta. The Strangulea form contains strangulation and the symptoms containing vasculopathy, blood supplying to the hernia and llus hernia that lead to the necrosis of hernia content when the intervention isn't occurred [2].

The incidence of inguinal hernia is about 25% for men and 2% for women. The incidence of inguinal hernia can increase with the aging so that it reaches to 50% in the 75 ages for men. Disease mainly is unilateral while it is bilateral in the 10% of issues. Childhood is the other age group that inguinal hernia increases so that the incidence rate is 0.8 to 4.4 %and also it also is 10 times more common in men than women while the highest cases are observed in the children who have been burned in the 32th week of pregnancy and their weight are less than 1 kg in the burning time (30% of cases). The inguinal hernia repair is one of the most common surgeries in the anesthesia and surgery centers. During the report of 2003 the surgeons of United States have been done around 770000 inguinal hernia repairmen [3]. Since the high number of incidences for the disease, appropriate treatment and minimum phenomenon are essential.

The surgery intervention is the selected treatment for inguinal hernia that includes three categories

Open surgery without mesh, open surgery with mesh and the Laparoscopic treatment with mesh. The aim of inguinal hernia surgery is avoiding the strangulation (the inguinal hernia which wasn't replace with manually and it can causes the incarceration of hernia), repairing of hernia, reducing the probability of recurrence, returning patients to their daily activities as soon as possible and minimizing the side effects of surgery and the illness after the surgery; different technics have been investigated for treatment of this disease until now [3].

The standard treatment of this phenomenon was open surgery with the stitches in 1980 but it was so painful and with several side effects. Then surgery with the mesh and without stitches were applied. Due to the reports of 2003 using the mesh is common by 93% for treatment of inguinal hernia and three-quarters of its treatments are constructed from Lichtenstein and/or tension free [3]. The method of treatment with mesh causes reducing the side effects of surgery, pain and recurrence of hernia, while the repairing method with mesh by Laparoscopic method affects the treatment similarly [4]. It was shown that treatment of inguinal hernia with mesh by Laparoscopic method has more side effects and recurrence probability than open surgery while it leads to reduce the pain after the surgery and reduce the hospitalization time and return patients to their daily works as soon as possible [5].

There isn't a method that has been identified as an ideal method, and all of the methods have advantages and disadvantages. In the other hand the successful treatment depends on the nature of hernia, the features and selection of patients and physicians. Applying the methods with mesh is preferred to the methods without mesh because of the reducing the side effects and pains[6, 7].

Chronic pain and hernia recurrence is one of the most important implications of the surgery. Incidence of chronic pain has been presented variable and also significant statistics due to the type of surgery technic and studies. The most important aspect of chronic pain is affecting the life of patients so that it reduces mental health and social performance of individuals. Chronic pain is defined as a pain that stays after normal requiring time for repairing the tissues. Determination of intervals for staying pain as the chronic is different due to the different scientific texts and the type of phenomenon. Generally determining the pure time for incidence the chronic form of the disease is a complicated activity due to the time of sore repairing for example the damage of environmental nerve needs more time for repairing and removing the infection. Three months is known as the time for recognizing acute pain. There isn't an exact definition for chronic pain of this phenomenon while some studies have been performed about the chronic pain and in the evaluating method of their time points are represented for describing them [8]. A large study is performed in Sweden and it is reported that 29% of patients (519 individuals) had chronic pains after the surgery of inguinal hernia so that 6% of them pain is interfered with their daily works. The factors which lead to remove the pain including:

The lower ages than middle, further hernia surgery because of its recurrence, were repairing by open method, occurring pains after the surgery and spending three years after the surgery of hernia. In the mentioned study gender, the method of anesthesia, the diameter of sac hernia, the phenomenon after the surgery, the type of hernia, the requiring for urgency surgery and ability to return the sac hernia by manual manner aren't affective for staying the pains. Also the factors which are related to the daily activity of individuals includes female gender, the ages lower than middle age, midline hernias, open surgery methods, recurrence of hernia and spending time lower than three years after the surgery [9].

Another similar study reported that 31% of patients were treated for the chronic pain after inguinal hernia (758 individuals) that it intervened with daily works of 6% of them. In this study young age's high level of pain and side effects after the repairing significantly and dependently causes chronic pains in patients [10].

Hernia recurrence is the other and important phenomenon of inguinal hernia surgery. The rates of recurrence are reported variously due to the following time of patients. The Meta-analysis studying reported rate of recurrence in the open surgery method without mesh as 4.4% and in the open surgery method with mesh as 1.4% [11.]

Mike and co-workers reported with a study in 2003 that 1051 patients with 2 and 4 following years, recurrence by Laparoscopic method were 3.8% and 4.9% and by the open surgery were 6.3% and 10% respectively and also the Bassini method was the most important factor [12].

Familiar background, smoking and also the technic of surgery arethe danger factors for having hernia and hernia recurrence especially in lower ages [13]. Two common technics of treatment for open surgery using mesh includes Liechtenstein (LS) and Read-Rives.

Liechtenstein method is an approximately simple technic which is performed by expert surgeons with different experiences and also have effective treatment results. In the Liechtenstein method after closing the sac hernia, mesh is fixed on the canal with appropriate dimensions. The Read-Rives method is in the peritoneal mode and also is harder than Liechtenstein method, while cause to better performing using the increase of abdominal pressure and also it doesn't make weak point. After separating the cord and hernia sac, the foam of canal is opened linearly and mesh is cultured under the abdomens transverse facial and then some 2 nylon stitches are sutured to the tubercular pubic, Ligament cooper and the pesos muscle [14].

Many methods have been performed for inguinal hernia surgery to assess the effectiveness and also long term and short term phenomenon, although the studies about Read-Rives and Lichtenstein methods for evaluating the chronic pain aren't enough. The aim of this study is comparing the mentioned methods for surgery that is a physiological experiment. Doeser and co-workers compared Lichtenstein and mesh plug methods for 697 patients in 2013 and reported that the incidence rate of chronic pain hasn't significant difference between two methods (21/268= mesh plug, 8.1%= hernias, Lichtenstein= 21/260 and hernias= 7.8%). Results of their studies showed that there weren'tsignificant difference between sensational disorders (17%, OR=0.53, 20% of patients) further surgery wasn't lower and significant (OR: 0.43; P=0.016) [15].

Malik and co-workers compared the Lichtenstein and the method of surgery without mesh (Modified Bossinis) on 800 patients and resulted that the post-operate pain of Lichtenstein method is lower than the Bossinis method significantly and also the recurrence rate was 2 and 7.1 for 36 months following respectively [16.]

YamacErhan and co-workers divided 94 patients for inguinal hernia into Lichtenstein and Per Peritoneal groups and reported after the 12 months following that chronic pain after both surgeries totally was 5% and separately were 6% with Lichtenstein method and 4% with Per Peritoneal method. The tense of pain was low to moderate so that patients could do their daily works. Incidence of pain in patients was 3% and led to limiting the daily works of three patients with Lichtenstein group [17]. Read-Rives method was applied in 2008 by Suchart and co-workers in the Surgeons Collage of Thailand on 25 patients and infection was observed only in one patient while recurrence wasn't reported. There were no difference with pain and time of hospitalization with other methods [18.]

Eklund and co-workers reported their results of studies around the repair of Inguinal Hernia by Lichtenstein and Laparoscopic methods after 5 years. Pain was 9.4% and 18.8 % respectively so that 1.9% and 3.5% announced that had moderate to high pains [19].

Akhavan Moghaddam compared Lichtenstein and Read-Rives methods on 126 patients with direct and indirect hernia in 2011 but he didn't present data about chronic pains while required narcotic level was lower for Read-Rives method and also patients returned to their daily works sooner. The recurrence was lower than Lichtenstein method in one year following (0 against 1.6 %) the length of surgery time wasn't different between two methods (47.8 and 46 minutes) while was similar to the surgery time of our study. The length of hospitalization time was higher in LS method while the time of hospitalization was 1.5 days in average[20]. Molden et al, compared two methods in 2004 and followed at least for two years, finally they reported that recurrence was higher in LS method than Read-Rives method but difference wasn't significant (4.3 against <1%) (26). Two mentioned studies reported low level of recurrence (1.3 against the 4.3% for LS) similar to our results that it is lower than 1-4.7%. Molden followed patients for two years [20].

Comparing the repair of indirect inguinal hernia by Lichtenstein method and Read-Rives method is the aim of this study. Results are applicable to make better decision about choosing the more appropriate method for repair of indirect inguinal hernia and also represent useful information about the pain after the surgery in both methods.

EXPERIMENTAL

Table 1 shows the variables of this study. The method of this study is randomized clinical experiments. The society is constructed of patients from 20 to 40 years old who had indirect and unilateral inguinal hernia and referred to the Besat hospital on Hamedan in 2012-2013 years. Entering factors to this study were the age which should be between 20 and 40 years old, and disease that should be unilateral and indirect inguinal hernia. Extracting factors of studying group were people who had the surgery of hernia; patients with bilateral hernia, direct hernia incarcerate hernia, femoral hernia, having the background of cutting under the navel, the background of chronic respiratory disease, pregnant women, familial background of inguinal hernia and femoral, Acites, smoking, individuals with a history of recurrent hernia repairs are in the same area and also drug users.

using can represent the level of post-operate pain (10):

P_1 (required pethedine injection in the mesh group)=20.3

P_2 (required pethedine injection in the sutured group) =51.2

Also the first level of error is 0.05 by computing the confidence interval (CI) as 95% equals (α)$z_{1-\beta=}$ 0.84 and $Z_{\alpha/2=}$ 1.96and due to the following formulation, the sample size in each group is 34 individuals. The probability of extracting some of patients from the study, having inadequate post-operate information were considered as 20% of sample size, so that total size of sample was 34 individuals.

$$N = \frac{(Z_{\alpha/2} + Z_{1-\beta})^2 [\,p1(1-p1) + p2(1-p2)]}{(p_1 - p_2)^2} = 43$$

Sampling method

Sampling method was general census and samples were entered gradual to the study.

Data collecting tools

Basic information of patients including first name, Last name, File number, Age, Gender, Type of the surgery, post-operate pain, Duration of hospitalization, Duration of surgery were recorded in a check list.

The tool for measuring the pain intensity was due to the Visible Analog Score (VAS). This tool is a 10 cm ruler which is calibrated from 0 to 10 and estimation of pains on this tool was asked of patients. Zero score was painless, 1-3 scores were slight pains, 6-4 was moderate pains and higher than 7 scores was severe pains [21].

Methods

The studying society constructed from patients who were suffered from indirect unilateral inguinal hernia and were referred to the Besat hospital of Hamedan. First conditions of the study were explained to all patients and informed consent was taken from them. Patients were divided into two groups randomly by Block randomization

where 5 pieces of papers which Read-Rives were written on them and 5 pieces of papers which Liechtenstein were written on them were thrown in a bag and they were mixed. Then each patient picked up on piece of paper. Patients were entered into groups due to the letter on the paper then papers were returned to the bags for 10 remained individuals.

Data analysis

Data were entered into the computer by SPSS software where results were represented by statistic tests containing Means, Standard deviation. Chi-square test and T-test were applied for analyzing results, repeated measure analysis was applied to evaluate and compare the post-operate pain.

Limitations

Inclusion and exclusion criterion that reduced the size of sample include lack of long-term evaluation of patients, no direct assessment of femoral hernia, likelihood of non-compliance, different people feel pain threshold and the lack of control for care of patients after clearance are the limitations of this study.

RESULTS AND DISCUSSIONS

Figure 1 shows the graph for means of patients' age in both Liechtenstein and Read-Rives methods. Average age for the first group of patients was (6.7) 29.11 and for the second group of patients was (6.17) 28.13. Minimum age of each group was 20 years old and maximum age of each group was 40 years old so that significant difference weren't observed between two groups (P>0.05). Also the differentiations of patients with the ages are shown in table 2 as Liechtenstein and Read-Rives groups by percent. As it is apparent 42 (97.7%) men and 1 women (2.3%) were in the first group and there were 41 men (95.3%) and 2 women in the second group where significant difference weren't observed between two groups about the gender (P>0.05).

Figure 2 shows the duration of surgery of inguinal hernia by two methods. Average duration of surgery was 41.53 minutes (2.77) that minimum and maximum times for surgery duration was 36 minutes and 50 minutes respectively with first group while average duration of surgery was 45.39 minutes (1.67) that minimum and maximum times for surgery duration was 43 minutes and 48 minutes respectively with second group so that difference was significant (P<0.001).

Read-Rives and Lichtenstein groups

Figure 3 shows the average of hospitalization durations for inguinal hernia surgery in the Read-Rives and Lichtenstein groups. The average of hospitalization duration was 33.4 (11.78) hours for first group that was 24 hours for minimum and 48 hours for maximum while The average of hospitalization duration was 39 (15.73) hours for first group that was 24 hours for minimum and 72 hours for maximum so that difference was significant between two groups (P>0.05).

Figure 4 shows the average of pain after the inguinal hernia repair from two groups based on the VAS. Comparing of pain severe by student T test revealed that 48 hours after the surgery, pain severe of first and second groups were 4.931 (1.42) and -5.97 (2.0) that was obtained by scale of Visible Analog scale of pain and also the difference was significant (P=0.007).

Average of post-operate pain was obtained 4.04 (1.6) and 5.3 for first group and second group respectively one month after the surgery (P=0.002).

Average of post-operate pain was obtained 3.41 (1.36) and 4.48 (1.72) for first group and second group respectively three months after the surgery (P=0.002).

Pain course was compared by Repeated Measure analysis and it was revealed that pain decreased gradually and significantly in both groups (P<0.001). Also decreasing of pain is associated with the high scores of VAS while reduction of pain with the first group was higher than second group significantly (P<0.001).

The process of changing in pain intensity with hernia repair by Lichtenstein method is shown in the figure 5. Also this process is shown for Read-Rives method in figure 6. Due to the graphs there is severe pain 48 hours and one month after intervention with the group of Lichtenstein method while there isn't similar severity for the Read-Rives group at the same intervals. Pains reduced three months after the surgery as 18.6% and 9.3% with first and second groups respectively.

Table 3 shows the incidence of recurrence for inguinal hernia by Read-Rives and Lichtenstein methods 6 and 12 months after the clinical

Table 1.

Variable	Role of variable			Type of variable				Scientific definition of variable	Scale of variable
				Quantitative		Qualitative			
	Field	Independent	Dependent	Contiguous	Separate	Name	Ratings		
The type of surgery		×				×		The hernia is repaired by mesh Pre Peritoneal and the mesh of canal bottom of canal by Read-Rives and Liechtenstein methods	Read-Rives and Liechtenstein
The time of surgery			×	×				Time to surgery starts with cutting and finishes with stitching	Minute
post-operate pain			×				×	The pain that appears after 48 hours, one week and three months after surgery	VAS : Vas0= painless Vas1-3=slight Vas4-6=moderate Vas7-10=severe
Recurrence			×			×		Returning the symptoms during 6 months after the surgery	1. It has 2. It hasn't
Hospitalization duration			×	×				Duration of staying in the hospital from the time of surgery until clearance	Day

According to the published reports in the Khartoum, the frequency of analgesic using can represent the level of post-operate pain (10):
P_1 (required pethedine injection in the mesh group)=20.3
P_2 (required pethedine injection in the sutured group) =51.2

intervention. Assessing the recurrence of 6 months showed that recurrence happened for 1 patient from first group (1.3%) and 2 patients from second group (4.7%). Results of the Fisher test didn't showed significant differences between two groups (P>0.05).

Assessing the recurrence of 12 months following showed that recurrence happened for 1 patient from first group (1.3%) and 2 patients from second group (4.7%). Results of the Fisher test didn't showed significant differences between two groups (P>0.05).

Table 2. Age separation of patients by percent for Lichtenstein and Read-Rives groups

Gender	Read-Rives (n=43)	Lichtenstein (n=43)
Male	97.7	95.3
Female	2.3	4.7

Table 3. Incidence of recurrence for inguinal hernia by Lichtenstein and Read-Rives methods 6 and 12 months after clinical intervention

The post-operateduration	Method of surgery		P
	Read-Rives (n=43)	Lichtenstein (n=43)	
6 months	1	2	NS
12 months	1	2	NS

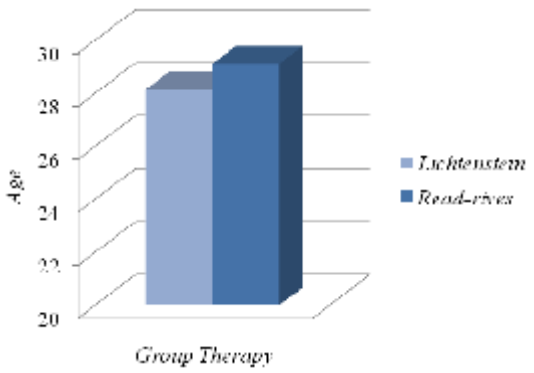

Fig. 1. Average age graph of patients in the Lichtenstein and Read-Rives groups

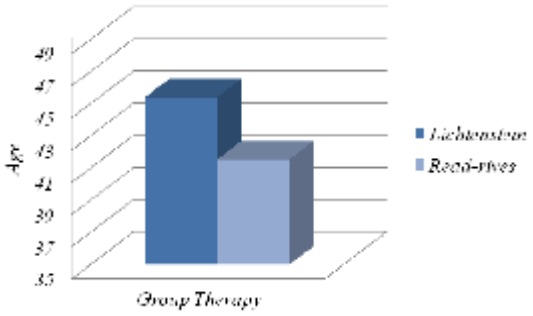

Fig. 2. Average duration of inguinal hernia surgery by two methods

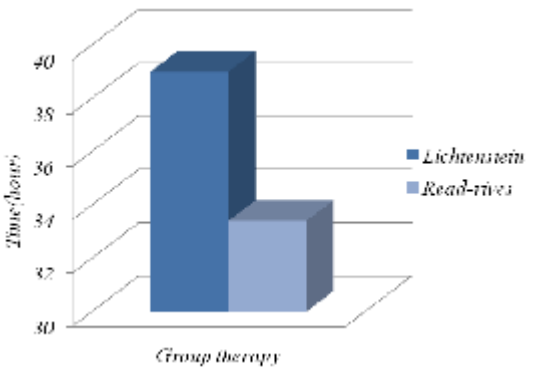

Fig. 3. Average of hospitalization durations for inguinal hernia surgery in the Read-Rives and Lichtenstein groups

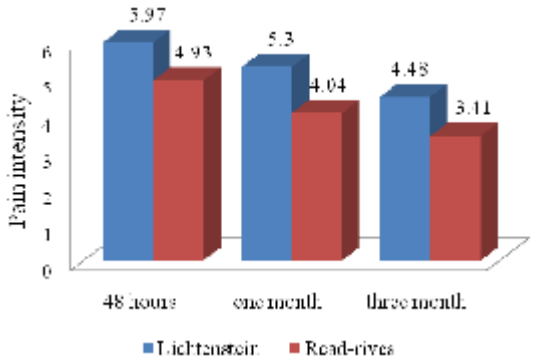

Fig. 4. Average of pain after the inguinal hernia repair from two groups based on the VAS

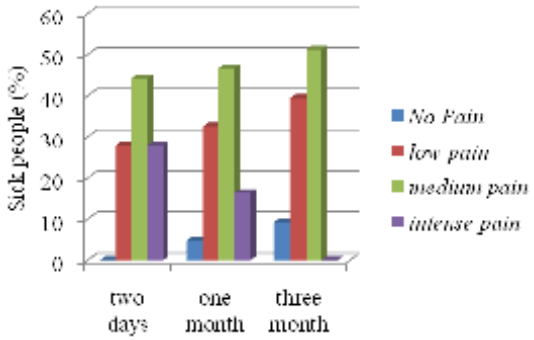

Fig. 5. The process of changing in pain intensity with hernia repair by Lichtenstein method

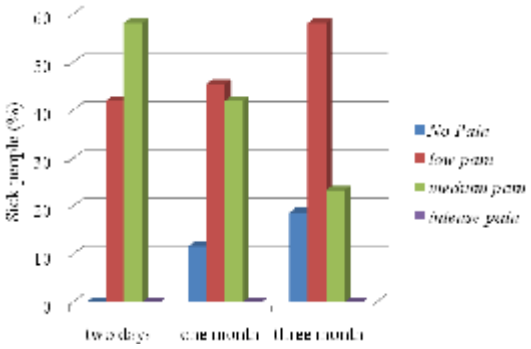

Fig. 6. The process of changing in pain intensity with hernia repair by Read-Rives method

CONCLUSION

The most important point of this study was the high percent of chronic pain so that only 11.6% of patients in the first group and 18.6% of patients in the second group hadn't pain three months after the surgery. Two main reasons for high level of chronic pain was lack of long-term follow-up by patients that it reduce with the time and being residential of our environment so that results showed that conversancy and experiences of doctors is an effective factor to reduce the complication.

Limitations of this study include lack of long term assess for pain and recurrence which may reduce, inclusion and exclusion factors that lead to reduce sample size, lack of assessment the postoperative complications in the two months and lack of the control on the patient care after the clearance that they can be considered in the future studies.

Our results showed that Read-Rives method was better than Lichtenstein because of the reducing the operation duration and chronic pain and there isn't significant difference between two groups for reducing the duration of hospitalization and recurrence rate. According to the results of meta-analysis study in 2012 that didn't show significant difference in the chronic pain, wound hematoma, testes and urinary problems, insensibility and duration of surgery between Lichtenstein and Pre-Peritoneal methods while rate of the recurrence of Pre-Peritoneal method was lower that Lichtenstein method [22]. Considering that Laparoscopic method hasn't spread in our country as same as open surgery, it is possible to say that studied technics are safe, effective and also they have low rate of recurrence for inguinal hernia repair so that Read-Rives method was preferred for us than Lichtenstein method.

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