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Research Article

Comparison Between Techniques of Inguinal Hernia Repair: Retrospective Study

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Abstract

Background: Chosen the choice of inguinal hernia repair for patient case by case is also challenging. The ideal technique must have low complication and low recurrences. There also should be simple technique, easily to perform and have high cost-efficiency.For these reasons, the HerniaSurge project suggested to use mesh-based technique for the main technique in treatment of inguinal hernia. In some situation, surgeon will have worrisome for using mesh-based repair such as contaminated field or surgeon in place that have minimal resources. In this study want to compare results of the techniques of inguinal hernia repair in dimension of difficulty of operation, postoperative complication, and cost of treatment.

Materials and Methods: This retrospective medical records reviews of all inguinal hernia repair done in the Sisaket hospital between January 2019 and December 2020 was performed.

Results: Moloney's darn repair had superior to other techniques in terms of length of hospital stay and cost of treatment in all situations of inguinal hernia especially when compared to Lichtenstein hernioplasty. Our results also shown that Bassini's repair still had treatment results and postoperative complications comparable to Lichtensteins hernioplasty.

Conclusion: Although mesh-based technique such as Lichtenstein herniolasty approved by HerniaSurge for standard treatment of inguinal hernia in the present. But, the other techniques such as Moloney's darn repair or Bassini's repair can be used for alternative choice in some situation or in area that have low resources.

Keywords: Bassini's repair; Endoscopic repair; Inguinal hernia repair; Lichtenstein hernioplasty; Moloney's darn repair; Preperitoneal repair; Retrospective comparative study

Abbreviation: LH: Lichtenstein Hernioplasty; MDR: Moloney's Darn Repair; BR: Bassini's Repair; ER: Endoscopic repair; PR: Preperitoneal Repair

Introduction

Inguinal hernia is the disease found in 27-43% of male and 3-6% in female[1] and the most of them are symptomatic and must be treated only by surgery [1]. The inguinal hernia repair was done up to 20 million patients per year [2] and most of them were success, but it can be recurred for 10% and had chronic groin pain for 10-12% [3]. In the present, there are clinical practice guidelines developed for improving the results of treatment at least 3 organizations such as the European Hernia Society guidelines in 2014 for management of adult inguinal hernia, [4] the International Endo Hernia Society guideline in 2011 [5], and the European Association for Endoscopic surgery guidelines in 2013 [6] for inguinal hernia repair by laparo-endoscopic repair. In 2014, 3 organization described above were created the inguinal hernia guideline of management in the project named HerniaSurge [3]. In that meeting, the European Hernia Society developed the EHS system for describing and classifying type of inguinal hernia. [7] Chosen the choice of inguinal hernia repair for patient case by case is also challenging. The ideal technique must have low complication and low recurrences. There also should be simple technique, easily to perform and have high cost-efficiency. In general, Surgeon-chosen technique depended on type of inguinal

hernia, anesthetic technique, and surgeon preference. So, most of them chose the mesh repair for choice of treatment. For this condition, European guidelines in 2009 showed that the results of open repair was comparable to laparo-endoscopic repair and suggested that should be using mesh-based repair for the gold standard of inguinal hernia repair [8] and was supported by Systematic Cochrane review in 2012 that the recurrence rate of Lichtenstein hernioplasty was lower than Shouldice repair and the other complication rate were comparable. [9] For these reasons, the HerniaSurge project suggested to use mesh-based technique for the main technique in treatment of inguinal hernia [3].

In some situation, surgeon will have worrisome for using mesh-based repair such as contaminated field or surgeon in place that have minimal resources [3]. In these group of non-mesh based repair, the Systematic Cochrane Review in 2012 showed that Sholdice repair was superior to other non-mesh based technique due to lower rate of recurrence, chronic groin pain, and wound hematoma. But, in the other hand, Shouldice repair had higher rate of surgical site infection and length of hospital stay compare to other non-mesh based repair [9]. For these reasons, the HerniaSurge suggested to using Shouldice repair for inguinal hernia repair if surgeon prefer to use non-mesh based repair [3]. However, there had some studies in non-mesh based repair other than Shouldice repair such as Bassini's repair or Moloney's darn repair showed that the results of these techniques were comparable to Lichtenstein hernioplasty. Nixon, et al. [10] showed that darning technique had the same recurrence rate compare to Lichtenstein repair. Maksoud, et al. [11] showed the same results of the recurrence rate and also showed that darning technique was lower operative time and postoperative pain from visual analog scale than Lichtenstein hernioplasty. In the same results of Finch, et al. [12], Zeybeck, et al. [13], Kaynak, et al. [14], and Rongviriyapanich [15] that showed the comparable recurrence rate and postoperative complication between darning technique and Lichtenstein hernioplasty but had better outcome in cost of treatment. In the same way, Kassab et al. [16] and Naveen, et al. [17] reported that Bassini's technique was comparable to Lichtenstein hernioplasty in recurrence rate and was better in postoperative pain. In the aforementioned studies show that Lichtenstein hernioplasty is now standard treatment for inguinal hernia repair, but non-mesh based technique such as darning technique or Bassini's repair were also used in rural area of the developing countries due to lower cost of treatmen. In this study want to compare results of the techniques of inguinal hernia repair in dimension of difficulty of operation, postoperative complication, and cost of treatment.

Material and Methods

This retrospective medical records reviews of all inguinal hernia repair done in the Sisaket hospital between January 2019 and December 2020 was performed. Patient demographic data, such as age, gender, body weight, height, and body mass index, Operative data, such as type and side of inguinal hernia, emergency of case, technique of inguinal hernia repair, and operative time, and the Results of treatment, such as postoperative length of hospital stay, intravenous opioid usage, cost of treatment, and postoperative complications were collected. The data were analyzed in group classify by the emergency of case in overall, elective case, incarcerated case, and strangulated case and compared between groups of surgical technique in Lichtenstein Hernioplasty (LH), Moloney's Darn Repair (MDR), Bassini's Repair (BR), Endoscopic Repair (EH), and Preperitoneal Repair (PR). This study was approved by the Research Ethics Committee of the Sisaket hospital under SSKH REC No.086/2021.

Inclusion and Exclusion Criteria

Patient afflicted with inguinal hernia repair in the Sisaket hospital between January 2019 and December 2020 who were older than 15 years old were included. Patient with bilateral inguinal hernia repair or under 15 years were excluded.

Statistical Analysis

The quantitative data were analyzed by using Chi-square test and the qualitative data were analyzed by using ANOVA. The p-value less than 0.05 were defined in statistical significance.

Results

From the retrospective medical reviews of patients undergone inguinal hernia repair in the Sisaket hospital between January 2019 and December 2020 found patients who met the inclusion criteria of 709 (male 697, female 12), Mean age was 59.63 years (16-97). Mean body weight was 58.42 kilograms (35-120). Mean Body Mass Index (BMI) was 21.84 kg/m2. In 709 patients were classified as elective case for 522 cases, incarcerated case for 179 cases, and strangulated case for 8 cases.

Overall Group

The results in the overall group showed that no statistical significance in general population data such as age, body weight. Meanwhile, it showed different about technique chosen in incarcerated or strangulated case that surgeon prefer not to use ER. (p-value=0.016). The results also shown different in operative time (p-value=0.000), length of stay (p-value 0.000), and cost of treatment (p-value=0.000) but it showed no different in terms of opioid use or postoperative complications. In subgroup analysis showed that PR had shortest and ER had longest operative time, MDR had shortest and BR had longest length of hospital stay, and MDR had cheaper and ER had most expensive cost of treatment as in Table 1.

	LH	MDR	BR	ER	PR	P-value
Age	59.42+/-15.478	60.55+/-14.631	59.93+/-15.471	47.54+/-16.711	60.97+/-13.761	0.062
Gender (Male: Female)	330:01:00	130:02:00	194:08:00	13:00	30:01:00	0.029*
BW (Kg)	57.82+/-10.23	58.72+/-9.63	58.96+/-10.90	64.23+/-9.80	57.74+/-12.50	0.205
BMI (kg/m^2)	21.68+/-3.61	21.93+/-2.91	22.00+/-3.80	23.63+/-3.61	21.50+/-4.11	0.315
Type (I:D:C)@	281:21:29	83:23:26	186:12:04	12:01:00	28:03:00	0.000*
Side (Right:Left)	210:121	80:52:00	115:87	08:05	16:15	0.508
Emergency (E:I:S)#	254:76:1	97:33:02	132:65:5	13:00:00	26:05:00	0.016*
Op time (min)	38.71+/-17.42	35.27+/-11.18	34.73+/-20.20	55.77+/-29.71	24.19+/-7.97	0.000*
Length of Stay (day)	1.43+/-1.08	1.12+/-0.41	2.02+/-1.84	1.69+/-0.95	1.65+/-2.09	0.000*
Cost (THB)	13096.34+/-3872.41	9980.54+/-1886.44	12752.32+/-6915.17	28816.91+/-4247.12	13488.82+/-4633.23	0.000*
Opioid (Dose)	0.32+/-1.102	0.18+/-0.52	0.45+/-0.94	0.15+/-0.78	0.29+/-0.53	0.11
Seroma	17	0	8	1	2	0.105
SSI	5	4	8	0	0	0.339
Orchitis	1	0	1	13	31	0.935
Recurrence	6	2	4	0	1	0.954
@ I=Indirect, D=Direct, C=Combine; # E=Elective, I=Incarcerated, S=Strangulated; *Statistical significance						

Table 1: The results of the OVERALL GROUP.

Elective Case

The results in the elective case showed that ER had lower age than other groups, but no different in body weight and BMI. The results also shown different in operative time (p-value=0.000), length of stay (p-value 0.000), and cost of treatment (p-value=0.000) but it showed no different in terms of opioid use or postoperative complications. In subgroup analysis showed that PR had shortest and ER had longest operative time, MDR had shortest and BR and ER had longest length of hospital stay, and MDR had cheaper and ER had most expensive cost of treatment as in Table 2.

	LH	MDR	BR	ER	PR	P-value
Age	60.72+/-14.222	61.10+/-13.774	60.90+/-14.894	47.54+/-16.711	61.62+/-14.868	0.028*
Gender (Male: Female)	253:01:00	95:02:00	125:07:00	13:00	25:01:00	0.029*
BW (Kg)	58.12+/-9.97	58.88+/-9.64	59.03+/-9.48	64.23+/-9.80	58.69+/-13.27	0.285
BMI (kg/m^2)	21.76+/-3.62	22.03+/-2.97	22.05+/-3.61	23.63+/-3.61	21.83+/-4.38	0.428
Type (I:D:C)@	211:19:24	51:22:24	121:09:02	12:01:00	23:03:00	0.000*
Side (Right:Left)	160:94	54:43:00	74:58:00	08:05	14:12	0.577
Op time (min)	38.02+/-17.56	33.71+/-9.98	30.72+/-13.34	55.77+/-29.71	25.00+/-8.25	0.000*
Length of Stay (day)	1.23+/-0.65	1.04+/-0.25	1.55+/-1.11	1.69+/-0.95	1.27+/-0.87	0.000*
Cost (THB)	12346.61+/-2364.49	9382.43+/-1340.28	11275+/-3589.67	28816+/-4247.12	12784.07+/-4233.51	0.000*
Opioid (Dose)	0.29+/-1.00	0.21+/-0.58	0.33+/-0.61	0.15+/-0.38	0.35+/-0.56	0.784
Seroma	14	0	5	1	2	0.161
SSI	4	2	4	0	0	0.772
Orchitis	1	0	1	0	0	0.908
Recurrence	5	1	2	0	1	0.858
# E=Elective, I=Incarcerated, S=Strangulated; @ I=Indirect, D=Direct, C=Combine; *Statistical significance						

Table 2: The results of the ELECTIVE CASE.

Incarcerated Case

The results in the incarcerated case showed no different in demographic data between groups but no patient was selected for ER in this group. The results also shown different in postoperative opioid use (p-value=0.002) and cost of treatment (p-value=0.001) but it showed no different in operative time, length of stay, or postoperative complications. In subgroup analysis showed that PR had shortest operative time, MDR and LH had shortest and BR and PR had longest length of hospital stay, and MDR had cheapest cost of treatment as in Table 3.

	LH	MDR	BR	ER	PR	P-value
Age	55.14+/-18.64	59.82+/-16.63	56.57+/-15.78	-	57.60+/-4.67	0.628
Gender (Male:Female)	76:00:00	33:00:00	64:01:00	-	05:00	0.623
BW (Kg)	56.86+/-11.11	58.00+/-9.93	59.52+/-13.42	-	52.80+/-5.93	0.428
BMI (kg/m^2)	21.42+/-3.60	21.70+/-2.81	22.08+/-4.23	-	19.74+/-1.51	0.473
Type (I:D:C)@	69:02:05	31:01:01	62:02:01	-	05:00:00	0.826
Side (Right:Left)	50:26:00	25:08:00	39:26:00	-	02:03	0.287
Op time (min)	40.72+/-16.83	38.94+/-12.36	38.69+/-23.09	-	20.00+/-5.00	0.12
Opioid (Dose)	2.00+/-1.64	1.36+/-0.65	2.52+/-1.59	-	3.60+/-4.72	0.002*
Cost (THB)	15395.83+/-6048.51	11483.91+/-2032.70	13627.49+/-4526.62	-	17153.52+/-5382.26	0.001*

Length of Stay (day)	0.42+/-1.09	0.09+/-0.29	0.63+/-1.26	-	0.00+/-0.00	0.087
Seroma	3	0	3	-	0	0.632
SSI	1	1	4	-	0	0.435
Orchitis	0	0	0	-	0	N/A
Recurrence	1	1	2	-	0	0.87
# E=Elective, I=Incarcerated, S=Strangulated; @ I=Indirect, D=Direct, C=Combine; *Statistical significance						

Table 3: The results of the INCARCERATED CASE.

Strangulated Case

The results in the strangulated case showed no different in demographic data, operative data, or postoperative complications between groups but no patient was selected for ER and PR in this group as in Table 4.

	LH	MDR	BR	ER	PR	P-value
Age	56	45.5+/-21.92	78.00+/-12.53	-	-	0.102
Gender (Male:Female)	01:00	02:00	05:00	-	-	N/A
BW (Kg)	54	63.00+/-4.24	49.60+/-5.32	-	-	0.066
BMI (kg/m^2)	19.83	20.70+/-1.56	19.50+/-2.64	-	-	0.849
Type (I:D:C)$^@$	01:00:00	01:00:01	03:01:01	-	-	0.794
Side (Right:Left)	00:01	01:01	02:03	-	-	0.688
Op time (min)	60	50.00+/-28.28	89.00+/-40.84	-	-	0.492
Length of Stay (day)	8	1.00+/-0.00	8.00+/-5.75	-	-	0.331
Cost (THB)	28767.5	14183.13+/-4112.00	40360.60+/-24817.36	-	-	0.431
Opioid (dose)	1	0.50+/-0.71	1.20+/-2.17	-	-	0.915
Seroma	0	0	0	-	-	N/A
SSI	0	1	0	-	-	0.18
Orchitis	0	0	0	-	-	N/A
Recurrence	0	0	0	-	-	N/A
# E=Elective, I=Incarcerated, S=Strangulated; $^@$ I=Indirect, D=Direct, C=Combine						

Table 4: The results of the STRANGULATED CASE.

Discussion

Chosen the choice of inguinal hernia repair for patient case by case is also challenging. The ideal technique must have low complication and low recurrences. There also should be simple technique, easily to perform and have high cost-efficiency. For these reasons, the HerniaSurge project suggested to use mesh-based technique such as LH, ER, or PR for the main technique in treatment of inguinal hernia [3]. However, in some situation, surgeon will have worrisome for using mesh-based repair such as contaminated field or surgeon in place that have minimal resources. So, in some areas such as in rural area of developing countries, surgeon still use non-mesh techniques such as BR or MDR. From our results showed that MDR had superior to other techniques in terms of length of hospital stay and cost of treatment in all situations of inguinal hernia (overall, elective, incarcerated, or strangulated) especially when compared to LH that was present

standard treatment recommended by HerniaSurge. This results demonstrated in the same way to studies of Nixon [10], Maksoud [11], Finch [12], Zeybeck [13], Kaynak [14], Rongviriyapanich [15] reported that darning technique was comparable to LH in terms of recurrence and postoperative complications but superior in cost of treatment. Our results also shown that BR still had treatment results and postoperative complications comparable to LH in the same result found in the study of Naveen [17].

Conclusion

Although mesh-based technique such as Lichtenstein herniolasty approved by HerniaSurge for standard treatment of inguinal hernia in the present. But, the other techniques such as Moloney's darn repair or Bassini's repair can be used for alternative choice in some situation or in area that have low resources.

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