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Original Research Article

A comparative study of modified Bassini's repair and Lichtenstein's repair for indirect inguinal hernia in young age population

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ABSTRACT

Background: Inguinal hernia surgery has significant world-wide diversity in management. European Hernia Society guidelines 2020, for management of groin hernias recommends the use of open non-mesh repair in specific patients or types (e.g. young males with lateral hernia)as an acceptable alternative to a Lichtenstein technique. The present study deals with the comparison of intra operative, postoperative course and clinical outcome of modified bassinis repair (non mesh) and Lichtenstein repair [mesh repair] for indirect inguinal hernia in young age population.
Methods: Observational analytical prospective cohort study, conducted in General Surgery, Peoples hospital, Bhopal from November 2022 to February 2024. Patient of indirect inguinal hernia in the age (16-35 years) group and operated by either Modified Bassinis (Group A, n=34) or lichtenstein hernia repair (Group B, n=48). The above study arms group were studied and compared.
Results: Mean duration of surgery among Group A patients was 62.65 minutes and 57.19 minutes in Group B. Seropurulent discharge among 2.9% patients in Group A and 4.2% in Group B and superficial SSI among 2.9% patients in Group A and 4.2% in Group B was reported. Chronic post-operative pain VAS score was assessed at end of 2nd week, end of 1 month and end of 3 months with statistically no significant among two groups.
Conclusions: Our study did not demonstrate any significant difference of one repair method over the other. However, an Individualized approach for cases with a customized strategy is recommended for surgical management of hernia.

Keywords: Groin hernia, Indirect inguinal hernia, Lichtenstein repair, Modified bassinis repair

INTRODUCTION

Inguinal hernia surgery was one of the most commonly performed operations by General Surgeons.[1] Groin hernia repair was globally performed in more than 20 million patients every year. Despite guidelines, there was significant worldwide diversity in groin hernia management.[1,2] Modified Bassini's repair for inguinal hernia involved suturing the transversalis fascia and the conjoined tendon to the inguinal ligament behind the spermatic cord with monofilament non-absorbable suture. The Lichtenstein method used mesh implantation, which had drawbacks such as chronic groin pain, foreign body sensations, abdominal wall stiffness, etc., which interfered with daily patient activities.[3] Additionally, problems like mesh migration, mesh rejection, sexual dysfunction leading to pain and impairment of sexual activity had also been reported after the mesh-based hernia repair technique.[4]

In the young age group of patients there is a higher risk of developing chronic pain after mesh repair.[5,6] Chronic pain after the surgery is also important to consider and a larger problem compared to hernia recurrence.[7] The EHS Consensus on international guidelines for management of groin hernias 2020 recommends that the use of open non-

mesh repair in specific patients or types (e.g. young males with lateral hernia)as an acceptable alternative to a Lichtenstein technique requires further studies.[8]

To compare the Modified Bassini's repair and Lichtenstein's repair for surgical treatment of indirect inguinal hernia in the young age population.

METHODS

Study design

The study included all the units in the Department of General Surgery at PCMS and RC. All patients with indirect inguinal hernia in the age group of 16 - 35 were enrolled in the study from November 2022 to February 2024, and surgery was planned after obtaining informed consent to participate in the study.

The intervention and the technique of surgery (MBHR or LHR) were decided after obtaining informed written consent from the patient, explaining both procedures for surgery. The type of surgery was decided by the treating surgeon, and informed written consent was obtained from the patient.

Sample size

A total of 82 patients were registered in the study after providing informed written consent. Two study groups were formed: MBHR (Group A) with 34 patients and LHR (Group B) with 48 patients.

Inclusion criteria

Patients diagnosed with indirect inguinal hernia (Type II Nyhus). Age group: 16-35 years were included.

Exclusion criteria

Patients having direct inguinal hernia (Medial groin hernia). Patients having combined Lateral and Medial groin hernia. Patients having Diabetes Mellitus, thyroid disorders, kidney diseases, collagen disorders, and patients taking immunosuppressive therapy.

Surgery technique

Modified Bassini's Hernia Repair (MBHR)–After making an incision in the groin crease, the superficial fascia and deep fascia were divided to expose the external oblique aponeurosis. The external oblique aponeurosis was identified and the superficial ring was defined. The external oblique aponeurosis was divided to open the inguinal canal.

The spermatic cord was lifted up from the floor of the inguinal canal and defined. The layer of the cremaster muscle was opened by incision. The indirect sac was separated from the cord structures by sharp dissection, preserving the spermatic cord and defining the indirect sac up to the deep ring. The sac was divided and transfixed at the deep ring. Plication of the transversalis fascia to repair the deep ring was performed if the deep inguinal ring was found to be larger than this size or if it was lax.

The conjoined tendon was sutured to the inguinal ligament with polypropylene '1' or 1-0 continuous interlocking sutures. The spermatic cord was repositioned in the canal, and the external oblique was closed using polypropylene 1 continuous interlocking sutures. Subcutaneous tissues were repaired with polyglactin '2-0' interrupted sutures. The skin was closed with monofilament simple/mattress suture as appropriate to the situation.

In Lichtenstein Hernia Repair (LHR) after dissection of the sac and herniotomy, polypropylene mesh was placed to cover the posterior wall of the inguinal canal and fixed to the inguinal ligament below and to the conjoined tendon above with '1-0' polypropylene interrupted sutures.

The rest of the steps of surgery remained the same as described above. The patients were followed during the surgery, and throughout the entire hospital stay (preop/intraop/postop), with postoperative follow-up at 3 weeks and up to 3 months.

A pre-designed and validated proforma was used to record the data by the principal researcher. The project guides validated the data collection periodically and supervised the authenticity of the data collection. At the end of the data collection, the data was entered into the sheets, and descriptive statistics were used for the demographic and clinical analysis using IBM SPSS 20.0 Software (IBM Corporation Armonk, NY, USA). Appropriate statistical tests were applied to calculate the p-value and statistical significance for categorical/continuous data. The $P<0.05$ was considered statistically significant.

RESULTS

Results revealed that 20 subjects of Group A and 17 subjects of Group B belonged to aged 16-25 years and 14 subjects of Group A and 31 subjects of Group B belonged to aged 26-35 years it was statistically significant ($p=0.035$).

In comparison of mean weight of study subjects among two groups results revealed that mean weight of group A participants was found 55.74 kg and of group B 60.75 kg, it was found statistically significant ($p=0.001$).

Results revealed that 4 subjects of group A and 2 subjects of group had swelling <6 months, 21 subjects of group A and 33 subjects of group B had swelling since 6 months to one year, 8 subjects of group A and 11 subjects of

group B had swelling since 1-2 years and one subject of group A and 2 subjects of group B had swelling >2 years it was found statistically non-significant (p=0.614) (graph 1).

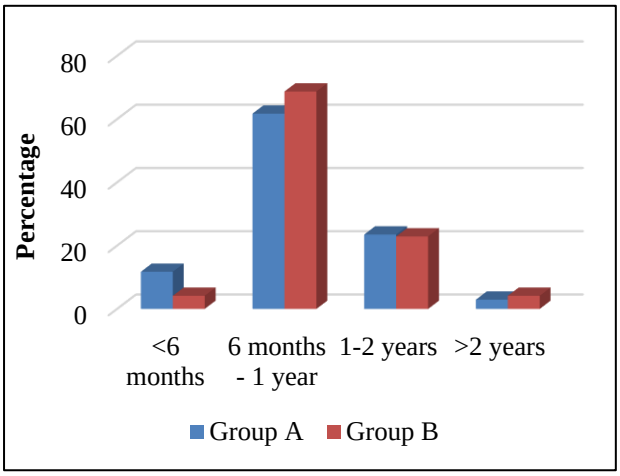

Figure 1: Duration of swelling-wise distribution of study subjects among two groups.

In comparison of side of hernia, results revealed that 14 subjects of group A and 20 subjects of group B had inguinal hernia at left side and 20 subjects of group A and 28 subjects of group B had inguinal hernia at right side it was found statistically non-significant (P=0.964)

With respect to symptoms, results revealed that 24 subjects of group A and 31 subjects of group B participants had no pain, 9 subjects of group A and 15 subjects of group B subjects had mild pain, one subject of group A and 2 subjects of group B had moderate pain and none of subject had any severe pain it was found statistically non-significant (p=0.842).

Results revealed that 11 subjects of group A and 15 subjects of group B had <1 cm size of int inguinal ring, 18 subjects of group A 24 subjects of group B had 1-2 cm and 5 subjects of group A and 8 subjects of group B had >2cm it was found statistically non-significant (p=0.960). Results revealed that mean duration of surgery among group A participants was 62.65 minutes and 57.19 minutes in group B it was found statistically significant (P=0.007). VAS score, pain scale ranges from 0 to 5, 0 indicating no pain, 1-2 indicating mild pain, 3 indicating moderate pain and 4-5 indicating severe pain, results revealed that vas score was found insignificant at operation day (P=0.07), day 1 (P=0.09), day 3 (P=0.60) and significant at day 5 (P=0.03).

Results revealed that mean duration of hospital stay was found 4.03 days in group A participants and 4.08 days on group B participants.

Results revealed that 7 subjects of group A and 8 subjects of group 1-2 days stayed at hospital after surgery, 15 subjects of group A and 20 subjects of group B 3-4 says, 10 subjects of group A and 16 subjects of group B 5-7 days and 2 subjects of group A and 4 subjects group B >7 days it was found statistically non significant (P=0.928).

Results found that 5 subjects of group A and 4 subjects of group B had hematoma as postop complication, 2 subjects of group A and 5 subjects of group B had seroma, one subject of group A and 2 subjects of group B had seropurulant discharge and one subject of group A and 2 subjects of group B had SSI, it was found statistically non-significant (P=0.709).

study subjects of two groups according to the presence of microbial flora results shows one subject of group A and one subject of group B had E coli floras and one subject of group B had klebsiella it was found statistically non-significant (p=0.386).

VAS score the pain scale ranges from 0 to 5, 0 indicating no pain, 1-2 indicating mild pain, 3 indicating moderate pain, and 4-5 indicating severe pain.

Results revealed that at end of 1 week 76.5 % pt of group A and 75% of group B have no pain which was statistically non-significant p 0.620, At end of 2nd week 94.1% of group A and 89.5% of group B have no pain which was statistically non-significant p 0.778, at end of 3 months 100%pt of each group become painless.

Results revealed that itching was found in 2 subjects of group A and 4 subjects of group B, pigmentation was observed in one subject of group A and 2 subjects of group B, Foreign body sensation in groin in 4 subjects of group B, Groin hypoaesthesia in 2 subjects of group B and Scar hypertrophy in one subject of group A and 3 subjects of group B it was found statistically non-significant (P=0.652).

Table 1: Age group-wise distribution of study subjects among two groups.

Age group (years)	Group A (MBHR), n=34		Group B (LHR), n=48	
	Frequency	Percentage	Frequency	Percentage
16-25	20	58.8	17	35.4
26-35	14	41.2	31	64.6
Total	34	100.0	48	100.0

Chi-square value–4.40; p=0.035*

Table 2: Size of internal inguinal ring-wise distribution of study subjects among two groups.

Size	Group A (MBHR) n=34		Group B (LHR) n=48	
	Frequency	Percentage	Frequency	Percentage
<1 cm	11	32.4	15	31.3
1-2 cm	18	52.9	24	50.0
>2 cm	5	14.7	8	16.7

Chi-square value–0.08; p value–0.960.

Table 3: Comparison of mean duration of surgery of study subjects among two groups.

Group	Mean	Std. Deviation	t value	P value
Group A (MBHR) n=34	62.65	9.55	-2.804	0.007*
Group B (LHR) n=48	57.19	7.29		

Table 4: Post-operative pain VAS scores-wise distribution of study subjects among two groups at different time points.

	VAS score	Group A (MBHR) n=34		Group B (LHR) n=48		Chi-square value; P value
		Frequency	Percentage	Frequency	Percentage	
Operation day	2	17	50.0	14	29.2	5.13;0.07
	3	17	50.0	31	64.6	
	4	0	0.0	3	6.3	
Day 1	0	2	5.9	2	4.2	7.82;0.09
	1	8	23.5	2	4.2	
	2	13	38.2	23	47.9	
	3	11	32.4	20	41.7	
	4	0	0.0	1	2.1	
Day 3	0	4	11.8	2	4.2	1.86; 0.60
	1	14	41.2	21	43.8	
	2	6	17.6	11	22.9	
	3	10	29.4	14	29.2	
Day 5	0	8	23.5	4	8.3	8.917;0.03*
	1	14	41.2	29	60.4	
	2	7	20.6	3	6.3	
	3	5	14.7	12	25.0	
Day 7	0	12	25.0	12	25.0	NA
	1	25	52.1	25	52.1	
	2	4	8.3	4	8.3	
	3	7	14.6	7	14.6	

Table 5: Distribution of study subjects of two groups according to hospital stay.

Hospital stay	Group A (MBHR) n=34		Group B (LHR) n=48	
	Frequency	Percentage	Frequency	Percentage
1 - 2 days	7	20.59	8	16.67
3 - 4 days	15	44.12	20	41.67
5 - 7 days	10	29.41	16	33.33
> 7 days	2	5.88	4	8.33

Chi-square value–0.45; p=0.928.

Table 6: Distribution of study subjects of two groups according to the presence of post-operative complications.

Post op complications	Group A (MBHR) n=34		Group B (LHR) n=48	
	Frequency	Percentage	Frequency	Percentage
Hematoma	5	14.7	4	8.3
Seroma	2	5.9	5	10.4
Seropurulent discharge	1	2.9	2	4.2
SSI	1	2.9	2	4.2

Chi-square value – 1.381; p=0.709.

Table 7: Chronic post-operative pain VAS scores-wise distribution of study subjects among two groups at different time points.

Time interval	VAS score	Group A (MBHR) n= 34		Group B (LHR) n= 48		Chi square value; P value
		Frequency	Percent	Frequency	Percent	
End of 2nd week	0	26	76.5	36	75	0.953,0.620
	1	6	17.6	9	18.7	
	2	2	5.9	3	6.2	
End of 1 month	0	32	94.1	43	89.5	0.079,0.778
	1	2	5.9	5	10.4	
End of 3 months	0	34	100.0	48	100.0	NA

Table 8: Distribution of study subjects of two groups according to the presence of complications after 3 months follow up.

Complications	Group A (MBHR) n= 34		Group B (LHR) n=48	
	Frequency	Percent	Frequency	Percent
Itching	2	5.9	4	8.3
Pigmentation	1	2.9	2	4.2
Foreign body sensation in groin	0	0.0	4	8.3
Inguinodynia	0	0.0	0	0.0
Testicular hypotrophy	0	0.0	0	0.0
Orchitis	0	0.0	0	0.0
Groin hypertrophy	0	0.0	2	4.2
Scar hypertrophy	1	2.9	3	6.3
Recurrence of hernia	0	0.0	0	0.0

Chi-square value – 2.45; P value – 0.652

DISCUSSION

More number of younger patients (58.8%) aged 16-25 years were enrolled in group A (MBR) in comparison to group B (LMR) (35.4%) whereas a greater number of patients (64.6%) aged between 26-35 years were enrolled in group B (LMR) as compare to 41.2% in group A (MBR) which was statistically significant (p=0.035, p<0.05).

The mean weight in group A (MBR) was 55.74±6.74 and in group B (LMR) was 60.75±6.37 which was statistically significant (p=0.001) There was statistically no significant difference w.r.t duration of swelling (p=0.614), side of hernia (p=0.964), presence of pain (p=0.841), size of internal inguinal ring (p=0.960). More than half (58.8% in group A) (58.3% in group B) had inguinal hernia on right side. Similar to our study, Darwish M et al reported that major cases were on right side.[9] Surgeons, as a collective, have shifted their focus from achieving "technical success" characterized by low recurrence rates as a measure of success. Instead, they have started evaluating other outcomes, with a particular emphasis on minimizing complication rates rather than recurrence rates Naveen et al.[10] The mean duration of surgery was more in Modified Bassini's repair (MBR) (group A) (62.65±9.55) than in Lichtenstein's repair (LMR) (group B) (57.19±7.29 which was statistically significant (p=0.007). Our results are in concordance with study carried by Naveen et al in which statistically significant difference was reported with Lichtenstein's repair taking lesser time to perform than Modified Bassini's repair (MBR) (p <0.05).[10] Similarly, in another similar study carried by Harjai et al, Lichtenstein's repair (LMR) took lesser time compared to MBR and reported that surgeons in training found Lichtenstein's repair (LMR) easier to learn and perform than the MBR.[11] Malik et al reported that there is a substantial difference in the overall operative time between two procedures, with the mean operative time in mesh (Lichtenstein) repair being much smaller than the mean operative time in Bassini's repair (p<0.001).[12]

The pain scale utilized in this study was a numerical rating scale, i.e., VAS scale which is a suitable instrument for the clinical evaluation of pain. The pain scale ranges from 0 to 5, with 0 indicating no pain, 1-2 indicating mild pain, 3 indicating moderate pain, and 4-5 indicating severe pain. The post-operative pain VAS score was found to be non-significant at operation day (p=0.07), at day 1 (p=0.09), at day 3 (p=0.60) and was significant at day 5 (p=0.03). At day 5, in Lichtenstein's repair (LMR) (group B), 25 % patients had VAS score 3 as compare to 14.7% in Modified Bassini's repair (MBR) (group A). Faish et al, reported that the intensity of discomfort was assessed among mesh plug hernioplasty patients using the analogue pain score, the pain score at 24 hours was 3 on a scale of 1 to 9.[13] No analgesia was

required post-op. The 95% confidence interval for the proportion of patients who scored 1, 2 or 3 within the first 24 hours after the procedure was between 0.61 and 0.74. Another study by Callesen et al, showed that there was no significant difference in pain following LMR or MBR (36% and 28%) which parallels to our study.[14]

Similarly, Lau et al, examined the clinical parameters that included age, gender, surgical procedure, hernia structure, and any post-operative complications.[15] Through a univariate analysis, it was found that patients who were 50 years old or younger and had an indirect inguinal hernia experienced a notably higher level of pain on the first day after surgery. Patients who were 50 years old or younger, had an indirect inguinal hernia, and underwent a modified Bassini repair reported a significantly higher pain level on the third day after surgery. After performing inguinal herniorrhaphy, a multiple regression analysis revealed that age was the sole independent predicted factor for the pain score on post-operative days 1 and 3.

Overall, the presence of post-operative discomfort was not influenced by factors such as surgical technique, gender, hernia anatomy, and post-operative morbidity. The only factor that had a notable impact on the post-operative pain score after ambulatory inguinal herniorrhaphy was age. In the study by Naveen N et al, the LMR group experienced significantly higher levels of pain only on postoperative day 7 which was observed only one case (in the LMR group) of severe pain, indicated by a numeric rating scale (NRS) score of 8, which may reflect nerve damage.[10] Tse et al, analysed patients undergoing a Bassini's repair and reported pain problems (10.3%) were generally transient and resolved in a period of weeks.[16]

During the repair of inguinal hernia using mesh, there is considerably less tissue tension employed to close the abdominal wall defect than in techniques in which sutures are used such as the Bassini's method. Therefore, it would be expected that there would be less pain involved in mesh repairs because of this reduced tension. The above studies contradict these claims. However, contrary to our study, Malik AM reported the mesh repair superior to the non-mesh repair of inguinal hernias in terms of postoperative pain. In today's fast-paced world, the length of time spent in the hospital may be the deciding factor when comparing rates of additional challenges, such as complications. The mean hospital stay was almost similar in Modified Bassini's repair (MBR) (group A) (4.03±1.62) than in Lichtenstein's repair (LMR) (group B) (4.08±1.76) with statistically no significant among both groups (P=0.887). In a similar study carried by Naveen et al study, the average hospital stay for patients with Modified Bassini's repair (MBR) was 3.97 days, while for patients with in Lichtenstein's repair (LMR) it was 3.46 days which is less than our study.[10] In another study conducted by Harjai et al, the mean duration of hospitalization in the post-operative phase for patients who underwent MBR was 5.74 days which is more than our study whereas in this study for patients who underwent LMR, the mean hospital stay was 4.97 days which is comparative to our study.[11]

Another study, contrary to our, Malik et al, reported that duration of hospitalization varies between the mesh (Lichtenstein) repair group and the non-mesh repair group.[12] The average hospital stay for the mesh repair group was 2 days, whereas it was 3 days for the non-mesh repair group.

The post-operative complications were found statistically not significant (p=0.709). Hematoma among 14.7% patients in Modified Bassini's repair (MBR) (group A) and 8.3% in Lichtenstein's repair (LMR) (group B) was reported in the current study. Haematoma as a complication of Bassini's repair between 0-20% in different studies has been reported Jonasson which corresponds to our study (14.7%).[17] In a study by Harjai et al, only five patients, who were operated for an indirect inguinal hernia with modified Bassini's technique developed hematoma of which three patients required re-exploration and the subsequent recovery was uneventful. In our study, none of the patients required re-exploration.[11]

Seroma among 5.9% patients in Modified Bassini's repair (MBR) (group A) and 10.4% in Lichtenstein's repair (LMR) (group B) was reported in the current study. Faish T et al found that 2% of individuals who had undergone mesh plug hernioplasty experienced the development of seroma.[13] In the study conducted by Naveen et al, 22.9% of patients who had received LMR and 8.6% of patients who had undergone MBR experienced the development of seroma.[10] Another alike study conducted by Harjai et al found that the LMR was 4.08% and the MBR was 6.78%.

Seropurulent discharge among 2.9% patients in Modified Bassini's repair (MBR) (group A) and 4.2% in Lichtenstein's repair (LMR) (group B) and superficial SSI among 2.9% patients in Modified Bassini's repair (MBR) (group A) and 4.2% in Lichtenstein's repair (LMR) (group B) was reported in the current study. The presence of *E.coli* was 2.9% in Modified Bassini's repair (MBR) (group A) and 2.1% in Lichtenstein's repair (LMR) (group B) and Klebsiella was not present in modified Bassini's repair (MBR) (group A) and in 2.1% cases with Lichtenstein's repair (LMR) (group B) with statistically no significant among both groups (P=0.386). Fowler B et al reported infection in 2 cases.[18] Darwish et al, found two patients in each group with superficial wound infection that needed only medical treatment after drainage to manage it. However, we could not find any study reporting which microbial flora was present in infection.

Zuvela et al, followed patients treated with modified Lichtenstein approach period of 37 months (ranging from 1 to 96 months), the incidence of sequelae was

haematoma, seroma, wound infections, ischemic orcihitis, testicular atrophy, disejaculation, hydrocoella, discomfort, 2 cases (0.16%) of recurrence.[19] Tse et al, analysed patients undergoing a Bassini's repair and reported that post-operative complications were relatively minor and was easily managed.[16] 10.8% with a wound hematoma/seroma, 8.4% with urinary retention and 2% with testicular ischemia not requiring orchidectomy and indicated that low recurrence rate, long term durability and relatively minor complications indicate that the Bassini's repair is still a good surgical option in patients opposed to a mesh repair.

The present study took into consideration long term chronic and persisting type of pain during follow-up to assess pain intrinsic to the technique. Chronic post-operative pain VAS score was assessed at end of 2nd week, end of 1 month and end of 3 months with statistically no significant among two groups. Improvement was reported in pain post-operatively with increase in pain and at the end of three months, all patients reported no pain in both groups. Faish T et al, reported relieved pain in 96% on follow up.[13]

Analysing through the literature, we went through another study by Patil et al, that compared the MBR+LMR with the LMR and reported that MBR+LMR technique involved addressing the problem with modified Bassini's repair and reinforcing it with Lichtenstein mesh repair. Mesh provides supplementary safeguard to the abdominal muscles.[20] This study tried to maximize strength by combining modified Bassini's and Lichtenstein mesh repair techniques.

CONCLUSION

Our study did not demonstrate any significant difference of one repair method over the other. However, an Individualized approach for cases with a customized strategy is recommended for surgical management of hernia. The mean hospital stay, post-operative complications were similar in Modified Bassini's repair (MBR) and in Lichtenstein's repair (LMR) with statistically no significant difference among both groups. E. coli was present Modified Bassini's repair (MBR) and Lichtenstein's repair (LMR) (group B) whereas Klebsiella was found in Lichtenstein's repair (LMR) group. The present study took into consideration long term chronic and persisting type of pain during follow-up to assess pain intrinsic to the technique. Chronic post-operative pain VAS score was assessed at end of 2nd week, end of 1 month and end of 3 months with statistically no significant among two groups. Improvement was reported in pain post-operatively with increase in pain and at the end of three months, all patients reported no pain in both groups.

Limitations of the study Nevertheless, due to the limited sample size and brief duration of follow-up in the present investigation, it may be necessary to conduct a bigger study with a longer follow-up period in order to draw any more conclusions.

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