



A COMPARATIVE STUDY OF THE FERTILITY OUTCOME IN ULTRALIGHT WEIGHT & HEAVY WEIGHT POLYPROPYLENE MESH IN LICHTENSTEIN REPAIR OF INGUINAL HERNIA

General Surgery

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ABSTRACT

Aims & Objective: To compare and analyse the fertility differences and outcomes of using a heavy and an ultralight polypropylene mesh for open repair of inguinal hernia, viz Sperm count & motility, Testicular volume & Testicular blood flow.

Material and method: The present Study was conducted at the Department of General Surgery in MLN Medical college and attached Swaroop Rani Nehru Hospital, Prayagraj, on patients admitted in from surgical OPD, between September 2019 to September 2020. Patients were followed up at the 3 months and 6 months since surgery for Sperm count & motility, Testicular volume & Testicular blood flow, through OPD visits, personal visits and in a few cases by video-calling or telephonic conversations, following the covid-19 protocols, especially between April '20 and Sept '20. Patients were divided into two groups based on the type of mesh used (The Ultralight Weight mesh group & the Heavy Weight mesh group) through randomisation by lucky draw method using chits in the box technique. On the basis of observations, outcome and results, data was statistically analysed to reach a definitive conclusion.

Conclusion: The study conducted above concludes that for both HWM & UWM groups, the postoperative change in sperm count is statistically not significant. For both groups, the postoperative change in Sperm Motility is statistically not significant. For both HWM and UWM groups, there is decrease in postoperative testicular volume at both 3 months and 6 months of followup but this decrease is not statistically significant. For both HWM and UWM groups, there was no case with any decrease in testicular blood flow was observed on USG Colour Doppler scanning.

KEYWORDS

Inguinal hernia, Heavy Weight Mesh, Ultralight Weight Mesh, Lichenstein repair

INTRODUCTION

Inguinal hernia is a condition known since ancient times. Written proof of its existence are available from manuscripts discovered from Mesopotamian and Egyptian cultures. Inguinal hernia, named after its anatomical location, is a protrusion of viscus or part of a viscus through the wall of its containing cavity. It is one of the most common afflictions affecting adults, with a lifetime risk of developing inguinal hernia of 27% in men and 3% in women.

The commonest and the Gold Standard for repair of inguinal hernias has been the tensionless mesh repair described by Lichtenstein, based on strengthening of the posterior wall of inguinal canal with a prosthetic material. All prosthetic material or meshes provoke a fibrous reaction resulting from fibroblast proliferation.

Infertility caused by inguinal hernia surgery is a recognized complication. The cause of the infertility can be related to either the vas deferens or the testicle.

Most men undergoing hernia repairs tend to be older and not concerned about maintaining their reproductive potential. However, with its widespread acceptance and ease of placement, polypropylene mesh repair is being offered increasingly to younger patients whose fertility status may well be an issue in the future. Inguinal vasal obstruction (IVO) is an uncommon and potentially unrecognized cause of azoospermia in the male infertility patient. Consequently, the true incidence of vassal obstruction is unknown. Known causes of IVO usually are related to inguinal herniorrhaphy and may result from iatrogenic vasal ligation or injury, vascular compromise, or extrinsic compression. The estimated incidence of injury to the vas deferens is 0.3% in adult hernia repairs.

METHODS

This study was conducted at the department of General Surgery in MLN Medical College, Prayagraj, on patients admitted in the department of General Surgery between September 2019 to September 2020. Most of the cases were taken up before the covid-19 lockdown starting in April, 2020.

INCLUSION CRITERIA

- Unilateral or bilateral inguinal hernia
- Males Patients.
- Age between 30 to 60 years.

EXCLUSION CRITERIA

- Patients without consent

- Female Patients
- Complicated inguinal hernias (Obstructed or Strangulated)
- Recurrent hernias
- Femoral hernia
- Patients with active infection in the inguinal region
- Patients with any chronic illness like diabetes mellitus, COPD or others.
- Patients with any serious morbid illness.

Patients were divided into two groups based on the type of mesh used to be used (The Ultralight Weight mesh group & the Heavy Weight mesh) through randomisation by lucky draw method through chits in the box technique. All patients underwent a standard Lichtenstein repair for uncomplicated inguinal hernia, performed by a single senior consultant surgeon after routine preoperative investigations. All surgeries were performed under spinal anaesthesia in a controlled and similar environment by the same surgeon. All patients received a single dose of preoperative antibiotic, Inj. Amoxy/Clav 1.2gms just before spinal anaesthesia. They received similar post op analgesia, using Inj. Diclofenac in the immediate postoperative period and a second dose after 8 hours of the first. They were shifted to oral analgesics from the following day.

Patients were then followed up at 3 Months and 6 Months later, for Sperm count & motility, Testicular volume & Testicular blood flow.

All patients underwent an Inguinoscrotal ultrasonography at 3 months and 6 months to note testicular volume. At 6 months, all patients underwent Semen analysis to evaluate sperm count & motility, Colour doppler for testicular blood flow.

On the foundation of the above, observations were made, results tabulated and data statistically analysed. Fishers-exact test and chi-square test were used for statistical evaluation.

RESULTS

Table 1: Age distribution of patients studied

Age in Years	Heavy mesh		Ultralight mesh	
	Number	%	Number	%
31-40	10	40	14	56
41-50	02	08	04	16
51-60	13	52	07	28
Total	25	100%	25	100%

Most patients were in age group 31-40yrs in both the groups. Youngest patient being 31 years old and eldest being 60 years old. Mean age of

patients in Heavy group is 45.48 and in Ultralight group is 41.8.

Table 2: Type of hernia in two groups of patients studied

Type of hernia	Heavy mesh		Ultralight mesh	
	No.	%	No.	%
Right Indirect	09	36%	09	36%
Left Indirect	02	8%	07	28%
Right Direct	08	32%	05	20%
Left Direct	02	8%	03	12%
Bilateral Defect	04	16%	01	4%
Total	25	100%	25	100%

Right Indirect hernia was predominant in both groups (36% each). In Heavy weight mesh group, there were 4 (16%) cases of Bilateral defect whereas only one (4%) case in the Ultralight mesh group.

Table 3: Preoperative and at 6th month comparisons of sperm count (Mean Value in million/ml)

Sperm Count	Preoperative	6 Months
Heavy Mesh (N=25)	44.44±3.08	43.16±4.53 (P value=0.2484)
Ultralight Mesh (N=25)	43.04±7.63	41.92±7.80 (P value=0.6101)

In HWM group, the preoperative mean Sperm count is 44.44 million/ml whereas for UWM group, it is 43.04 million/ml.

On follow of 6 months, mean sperm count for HWM group is 43.16 million/ml whereas for UWM group, it is 41.92 million/ml.

For both the groups, the postoperative change in sperm count is statistically not significant with P value 0.2484 and 0.6101, respectively.

Table 4: Preoperative and at 6th month comparisons of Sperm Motility (Mean Value in %)

Sperm Motility	Preoperative	6 Months
Heavy Mesh (N=25)	65±3.18	64.24±3.82 (P value=0.4483)
Ultralight Mesh (N=25)	66.16±2.40	65.48±2.41 (P value=0.3225)

In HWM group, the preoperative mean Sperm Motility is 65% whereas for UWM group, it is 66.16%.

On follow of 6 months, mean Sperm Motility for HWM group is 64.24% whereas for UWM group, it is 65.48%.

For both the groups, the postoperative change in Sperm Motility is statistically insignificant with P value 0.4483 and 0.3225, respectively.

Table 5: Preoperative, at 3 months and at 6th month comparisons of testicular volume (Mean Value)

Testicular volume	Preoperative	3 Month	6 Month
Heavy Mesh(N=25) Operated Side	15.78±1.29	15.37±1.29 (P value=0.30)	15.16±1.28 (P value=0.11)
Non-Operated side	14.74±1.39	14.62±1.29 (P value=0.75)	14.60±1.28 (P value=0.71)
Ultralight Mesh(N=25) Operated side	16.10±1.47	15.61±1.43 (P value=0.23)	15.34±1.45 (P value=0.09)
Non-Operated side	14.81±1.14	14.68±1.15 (P value=0.68)	14.64±1.13 (P value=0.60)

In HWM group, the preoperative mean testicular volume on operated side was 15.78 cc³ while non-operated side, it is 14.74 cc³ whereas for UWM group, it is 16.10 cc³ and 14.81 cc³ respectively.

On 3 months of followup for HWM group, mean testicular volume on operated side was 15.37 cc³ and for non-operated side, it was 14.62 cc³ with statistically non significant change in volume with P values 0.30 and 0.75 on operated side and non operated side, respectively. Similarly, for UWM group, mean testicular volume on operated side was 15.61 cc³ and for non-operated side, it was 14.68 cc³ with statistically non significant change in volume with P values 0.23 and 0.68 on operated side and non operated side, respectively.

On 6 months of followup for HWM group, mean testicular volume on operated side was 15.16 cc³ and for non-operated side, it was 14.60 cc³

with statistically non significant change in volume with P values 0.11 and 0.71 on operated side and non operated side, respectively. Similarly, for UWM group, mean testicular volume on operated side was 15.34 cc³ and for non-operated side, it was 14.64 cc³ with statistically non significant change in volume with P values 0.09 and 0.60 on operated side and non operated side, respectively.

For both HWM and UWM groups, there is decrease in postoperative volume at both 3 months and 6 months of followup but this decrease is not statistically significant, with p values 0.30 and 0.11 respectively for HWM group and 0.23 and 0.09 respectively for UWM group.

Table 6: Preoperative and at 6th month comparisons of testicular blood flow (On Operated Side)

Testicular Blood Flow (operated side)	Preoperative	6 Months
Heavy Mesh(N=25) Normal Flow	25	25
Decreased Flow	0	0
Ultralight Mesh(N=25) Normal Flow	25	25
Decreased Flow	0	0

For both HWM and UWM groups, there was no case with any decrease in testicular blood flow was observed on USG Colour Doppler scanning. This may account from the fact that Peak Systolic Velocity and Peak Diastolic Velocity of flow could not be measured due to technical reasons at our center.

DISCUSSION

In our study, it was found that most of the inguinal hernia cases were right sided and of indirect type hernia. It is well established that inguinal hernia is more common on right side with direct type in older age groups and indirect type in younger age group (Bailey & Love's short practice of surgery).

Several studies have been conducted to assess testicular damage following mesh repair inguinal surgery. These studies focused upon preoperative and postoperative testicular volume and blood flow of the patients in relation to the techniques used for inguinal surgery. In a study conducted by Ahmet Ali Tuncer et al⁶ in 2017, Preoperative and postoperative testicular volumes were not statistically different when compared to contralateral testes. Similarly, in a study by Giuseppe Brisinda et al¹² in 2008, there is no evidence for a significant impairment of funicular structures after open hernia repair using tension free techniques.

In our study for both HWM and UWM groups, the changes in post operative volume are lower than preoperative testicular volume, but were not statistically significant for a followup on 3 months and 6 months. These changes on volume may account from the fact that relieving pressure on spermatic cord may alleviate any testicular edema, as consistent with the studies conducted by Magnus Hallén et al¹⁰ in 2012 and Cláudio de Saboya David et al⁷ in 2018.

In a study conducted by S E El-Awady et al¹¹ on beneficial effect of inguinal hernioplasty on testicular perfusion and sexual function including 40 patients. It concludes that Lichtenstein tension-free hernioplasty improved sexual function and generic quality of life without adverse mesh effects on testicular volume or perfusion. J Zieren et al¹³ conducted study on Impact of ilio-inguinal nerve excision on sexual function in open inguinal hernia mesh repair a prospective follow-up study including 84 patients. It concludes that neurectomy of the ilio-inguinal nerve during surgical repair of inguinal hernia could have a favourable influence on sexual function without relevant complications. It causes significantly less sexual problems compared to preservation of the nerve and it is recommended especially for patients with pre-operative sexual dysfunction due to the groin hernia.

In contrary to above study, a study conducted by David Shin et al¹⁵, Eight institutions in the United States reported a total of 14 cases of azoospermia secondary to inguinal vasal obstruction related to previous polypropylene mesh herniorrhaphy. Patient characteristics and operative findings were forwarded to 1 center for tabulation of data. It concluded that Reconstruction to restore fertility can be difficult secondary to fibrotic reaction.

In our study, it is found that there were changes in sperm count and

motility at a followup period of 6 months for both HWM and UWM groups, but these changes are statistically not significant. These findings are also evident from the previous studies conducted by Magnus Hallén et al¹⁰ in 2012. In this retrospective study on 185 patients of male inguinal hernia surgery were evaluated. Their was no case of infertility recorded in their series.

In a study conducted by Dragan Krnić et al⁷ in 2016 on on influence of incarcerated inguinal hernia mesh repair on testicular circulation, it was found that although statistically significant differences in values of testicular flow parameters in observed time, final values remained within the reference ranges in all patients. Similar results were obtained from studies by Giuseppe Brisinda et al¹² in 2008 and J Zieren et al¹³ in 2001. These studies concluded that the polypropylene mesh probably does not cause any clinically significant effect on testicular flow.

In a study by S E El-Awady et al¹¹ in 2009, among Forty male patients. no differences in peak systolic velocity were observed between the hernia and healthy sides of the body (P 0.05). Preoperatively, there was a significantly higher end diastolic velocity (P 0.04) and resistive index (P 0.001) on the hernia side compared with the normal side; these elevations returned to normal postoperatively. Similar results were obtained from the studies by Magnus Hallén et al¹⁰ in 2012 and J Zieren et al¹⁴ in 2008. These studies concludes that Lichtenstein repair of Inguinal hernia had improved testicular perfusion postoperatively.

In our study for both HWM and UWM groups, there was no case with any decrease in testicular blood flow was observed on USG Colour Doppler scanning. This may account from the fact that Peak Systolic Velocity and Peak Diastolic Velocity of flow could not be measured due to technical reasons at our center for the duration of this study.

CONCLUSION

In this comparative study between Heavy Weight Mesh (HWM) and Ultralight Weight Mesh (UWM) polypropylene mesh in Lichtenstein repair of inguinal hernia which was conducted in Swaroop Rani Nehru Medical College and Hospital. Total of 50 patients were studied. 25 Patients each were allotted in Heavy mesh group and Ultralight mesh group respectively.

The conclusions drawn from the above study are as follows:

- Most of the inguinal hernia cases were right sided hernia, which were mostly indirect type in younger age group and direct type in older age group.
- For both the groups, the postoperative change in sperm count is statistically not significant with P value 0.2484 and 0.6101, respectively.
- For both the groups, the postoperative change in Sperm Motility is statistically insignificant with P value 0.4483 and 0.3225, respectively.
- For both HWM and UWM groups, there is decrease in postoperative testicular volume at both 3 months and 6 months of followup but this decrease is not statistically significant, with p values 0.30 and 0.11 respectively for HWM group and 0.23 and 0.09 respectively for UWM group.
- For both HWM and UWM groups, there was no case with any decrease in testicular blood flow was observed on USG Colour Doppler scanning.

LIMITATION

Due to covid-19 pandemic situation, only 50 patients were included in the study for given time period. Therefore, a more generalised study is needed for an accurate comparison of outcomes between ultralight and heavy weight mesh.

Conflicts of interest

There are no conflicts of interest.

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