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Effect of Bilateral Inguinal Mesh Hernioplasty on Vas Deferens Function and Vascular Status of Testes

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Abstract: ***It is well recognized and established that the fibroblastic process around the polypropylene mesh is essential for posterior wall reinforcement but can also be harmful to organs and tissue structures around the mesh which can trap and damage contents of the spermatic cord. Therefore, it is of concern and there is a strong rationale that such a process especially in a bilateral tension free mesh repair can cause inguinal vasal obstruction leading to infertility. 25 patients at MGM Medical College and Hospital were assessed preoperatively and postoperatively after1,2 and 3 months using Color Doppler of testes and Semen Analysis. 16 % of the cases i.e only 4 patients showed some effect on vas deference function and vascular status of testis in the form of oligospermia, oligoasthenospermia and or reduced vascularity of testis. patients in whom oligospermia or reduced vascularity of testes was observed were clinically and statistically non significant and was most probably a result of improper surgical technique and traumatic handling of spermatic cord structures and not due to fibroplastic reaction of the mesh. Thus mesh hernioplasty continues to be the ideal surgical repair for inguinal hernia.***

Keywords: Inguinal Hernia, Tension Free Mesh Repairs, Inguinal Vasal Occlusion

1. Introduction

'A hernia is defined as an abnormal protrusion of an organ or tissue through a defect in its surrounding walls'. Although a hernia can occur at various regions of the body, it is most commonly seen over the anterior abdominal wall, particularly the inguinal region.[1]

Among all hernias 75% are inguinal hernias. 50% of these are indirect and the remainder are direct inguinal hernias. Femoral hernias account to only 3% of all groin hernias.1The risk of developing a inguinal hernia is 27 % in men and 3 % in women.[2] Most of the inguinal hernia repairs that is 90% are performed in men and only 10% in women. Males have shown a bimodal peak of distribution of inguinal hernias with peaks before the age of 1 year and after the age of 40 years. It was found that those of age 25 years to 34 years had prevalence rate of inguinal hernias of 15%, whereas those age 75 years and over had a rate of 47%.2

The tension-free repair has now become the dominant method of inguinal hernia repair. It was realized that during hernia repair tissue tension is the principal cause of recurrence, hence current practices in hernia management use a synthetic mesh prosthesis to bridge the defect while reducing tension, this concept was popularized by Lichtenstein.1 During 1980s, Lichtenstein popularized the tension free repair, over the standard tissue-based repairs with the widespread acceptance of prosthetic materials for inguinal floor reconstruction. This technique was superior to previous tissue-based repairs as the mesh could restore the strength of the transversalis fascia, thereby avoiding tension in the defect closure. Superior results were seen regardless of hernia size and type, and were achievable among expert and newcomer hernia surgeons alike.[2]

The implantation of mesh in hernia repair surgery is a tremendous and extraordinary breakthrough, as it significantly reduces the recurrence rate and therefore decreases the risk of spermatic cord injury during reoperation for recurrences of inguinal hernias.

It is well recognized and established that the fibroblastic process around the polypropylene mesh is essential for posterior wall reinforcement but can also be harmful to organs and tissue structures around the mesh which can trap and damage contents of inguinal canal, inguinal nerves, intestine, and urinary bladder. Therefore, it is of concern and there is a strong rationale that such processes can also involve the vas deferens and vessels in spermatic cord when it is exposed to the mesh after dissection of the spermatic cord causing its obstruction leading to infertility.

It is difficult to prove the incidence of unilateral vas deferens obstruction leading to infertility since such a process doesn't give rise to any clinical symptoms and does not compromise fertility due to normal function of the testis on the unaffected side of inguinal hernia.

The patients presented in this study are those in which fertility was compromised due to bilateral reproductive system pathology, at least on one side due to vas deferens or vessel occlusion in spermatic cord after hernioplasty. The compromise on the other side was either due to contralateral varicocele, hydrocele or undescended or dysfunctional testis

Even though the rate of inguinal vassal occlusion due to the foreign body fibroblastic reaction of the mesh is not actually know there stands a strong rationale that such an event may take place and there is a definite need to evaluate the rate of IVO and find its significance.

This evaluation was done by means of Semen analysis and color doppler study of testes. Patients will be assessed by the following investigations.

1) Colour Doppler of Testes preoperatively and post operatively to assess testicular vascular function/status.
2) Semen Analysis: at baseline and after1, 2 and 3 months post op. Semen analysis was done after abstinence of 3 days.

Incidence of azoospermia or fall in sperm count and compromised vascular status in post op cases was used to identify and prove the incidence of spermatic cord and vas deferens and vascular obstruction in mesh hernioplasty due to fibrosis affecting the spermatic cord structures. Color doppler was used to assess testicular vascular function pre op and post op.

2. Literature Survey

In 1963, Usher introduced the Polypropylene monofilament knitted mesh as a modified and improved version of the polyethylene plastic mesh mentioned in his previous works. Most surgeons at that time preferred to use a mesh for large incisional hernias, sliding inguinal hernias, or recurrent inguinal hernias. There were largely concerns about increased wound infections, sinus tract formation, and prolonged wound healing, because of which the use of such prosthetic meshes was limited. Limited use was made with concern even though low infection and recurrence rates were reported when the mesh was used as the primary repair or for onlay repair in direct hernias. A revolutionary and first of its kind concept of tension-free repair was introduced by Lichenstein in 1989 to be for all primary inguinal hernias. This groundbreaking concept employed the use of prosthetic polypropylene mesh. Unlike most of the surgeons who preferred to use synthetic mesh for difficult cases, Lichenstein made its use a routine for all groin hernias and advocated its standardization as an ideal surgical repair for primary inguinal hernias. Further studies genuinely showed low recurrence and infection rates using this technique. Because of its technical ease and superiority over other surgical techniques and associated minimal morbidity, tension-free herniorrhaphy with polypropylene mesh was preferred and standardized rather than the tissue repair techniques used by Bassini, McVay, and Shouldice and has become the preferred method of treatment of inguinal hernia repairs regardless of patient age or severity of defect. The large success and acceptance ratesof the polypropylene mesh in inguinal hernia repairs have been attributed to its tensile strength. The scar tissue is created by the post mesh implantation dense fibroblastic inflammatory reaction of the knitted monofilament incorporating the prosthetic mesh with the surrounding tissue which the body considers as a foreign object. This intricate and precisely interwoven prosthetic mesh of polymer fibers is very thin and porous. It is less easily able to harbor infection and yet is very easily infiltrated with fibroblasts that impart permanent strength to the repair in the form of fibrosis and other cellular elements like macrophages, neutrophils and collagen. This fibrotic reaction appears to strengthen the floor of the inguinal canal without increasing the tension in the repaired tissue and decreases the incidence of recurrence. As this fibrotic reaction is expected by the human body, the spermatic cord and its vital structures like the vas deferens, that lie anterior to the mesh, could closely be affected in some manner[3] and this was the fundamental basis for conducting this study.

3. Methods/ Approach

25 patients who underwent inguinal mesh hernioplasty at MGM Medical College and Hospital were assessed preoperatively and postoperatively after1,2 and 3 months using Color Doppler of testes and Semen Analysis.

Inclusion Criteria:

1) Only males
2) Male patients having bilateral inguinal hernia
3) Male patients having unilateral inguinal hernia with compromised reproductive function on contralateral side (i.e. obstructive pathology –previously operated cases of inguinal mesh hernioplasty, hydrocele, varicocele, undescended testes or any testicular reproductive dysfunction

Exclusion Criteria

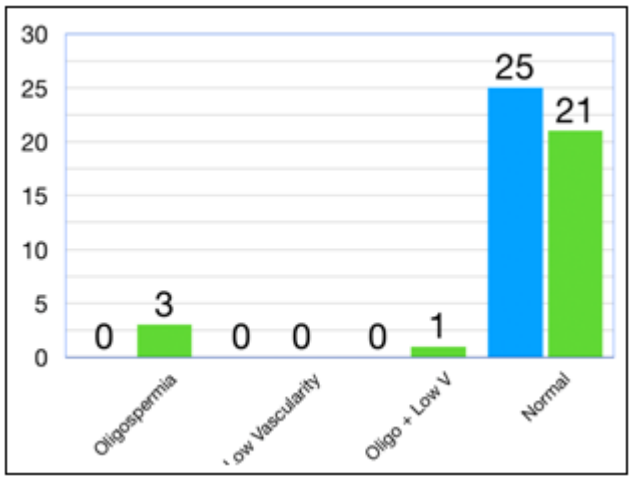
1) Male patients having compromised reproductive function in both testes
2) Male patients having compromised reproductive function on ipsilateral side of hernia.Patients were assessed by the following investigations; Color Doppler of testes preoperatively and postoperatively to assess testicular vascular function/status and Semen Analysis : at baseline and after1, 2 and 3 months post op. Semen analysis was done after abstinence of 3 days.

4. Results and Discussion

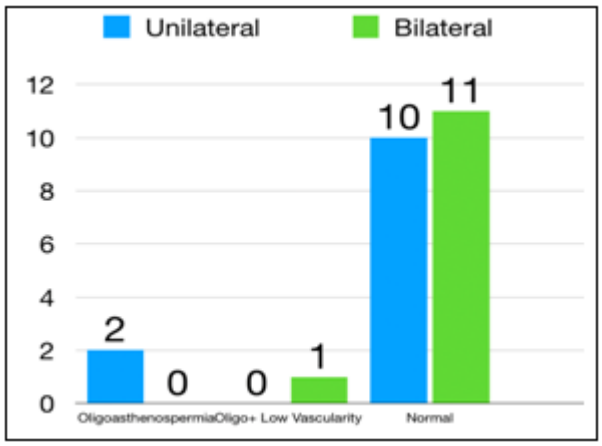
The following observations were seen in our study ; the age wise distribution of our study population showed maximum patients i.e. 6 in the age group of 60-69 years the rest were distributed as - 2 patients in the age group 20-29 years , 4 patients in 30-39 years, 5 patients in 40-49 years, 5 patients in 50-59 years and 3 patients in 70-79 years of age.

According to the presentation of inguinal hernia 48 % i.e 12 patients had unilateral inguinal hernia, 11 patients had a previously operated contra lateral inguinal hernioplasty and only 1 patient had an inguinal hernia with a contra lateral compromised testicular vascularity.

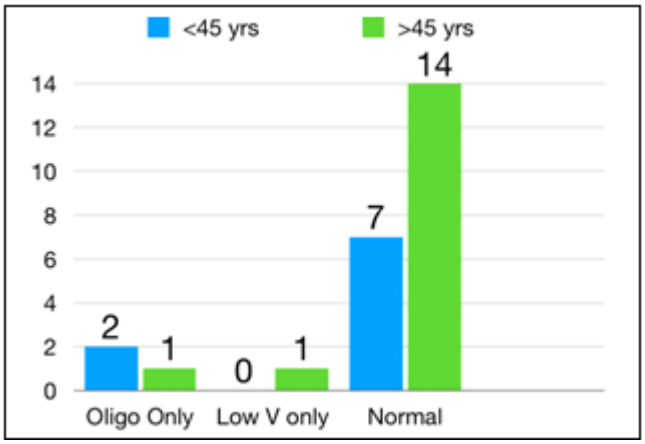
On comparison of pre and post operative Color Doppler of scrotum and semen analysis ,post-operatively it was observed that 16 % i.e 4 patients had some effect on vas deferens function and vascular status of testis in the form of oilgospermia(3), oligoasthenospermia and reduced vascularity of testes both (1) .



On comparison of post-operative Doppler and Semen analysis according to type of hernia repair, out of the 12 patients who underwent unilateral inguinal mesh hernioplasty only 2 patients i.e 16% showed only oligoasthenospermia and out of the 13 patients who underwent bilateral inguinal mesh hernioplasty 1 patient had only oligoasthenospermia and 1 patient had only reduced vascularity of a single testis.



On comparing Color Doppler scrotum and semen analysis post-operatively according to age 2 patients out of 7 patients below the age group of 45 years had oligospermia and 2 patients out 16 above the age group of 45 years had oligospermia and reduced vascularity



To summarise the results ; postoperatively we found that only 16 % of the cases showed some effect on vas deferens function and vascular status of testis of which - 3 patients showed only oligoasthenospermia on semen analysis with normal scrotal Doppler study i.e 12% of the sample size . Only 1 patient i.e 4% of the sample size had both oligoasthenospermia along with reduced vascularity of single testis (right side). While 84% of the sample size i.e 21 out of 25 patients observed had normospermia with maintained vascularity of both testes suggesting and insignificant number of patients affected due to mesh hernioplasty. 2 patients (16%) among the 12 patients with unilateral inguinal hernia with contra lateral side compromise had only oligoasthenospermia post-operatively while non had reduced vascularity of testis. Among the 13 patients with bilateral inguinal hernia at presentation only 1 patient i.e 7% of the cases had only oligoasthenospermia and only 1 patient i.e 7% of the cases had both oligoasthenospermia and reduced vascularity of testis that too only the right testicle while the left one remained unaffected. This shows insignificant affection of vas deferens function and vascular status of testes. Considering the age group of post-operative inguinal mesh hernioplasty patients affected patients were of ages 27 years, 41 years, 46 years and 66 years showing no significant age specific affection.

5. Conclusion

After bilateral mesh inguinal hernioplasty the semen analysis reports and scrotal Doppler studies performed upto 3 months post operatively when fibrosis is said to have occurred conclude that :

1) The number of patients affected out of the total studied is nonsignificant.
2) Those affected do not show any significance between the type of presentation of inguinal hernia and the repair performed i.e. effect on vas deference and vascular status of testes is not significant in bilateral inguinal mesh hernioplasty or unilateral mesh inguinal hernioplasty with contralateral compromise (previous history of contralateral inguinal mesh hernioplasty)
3) There is no age specific effect of mesh hernioplasty.

This suggests that, the patients in whom oligospermia or reduced vascularity of testes was observed was most probably a result of improper surgical technique and traumatic handling of spermatic cord structures and not due to the fibroplastic reaction of the mesh. This improper surgical technique and traumatic handling could be a result of lack of expertise and improper tissue handling at the level of junior residents since such mishandling and the surgical outcomes produced were a rare event in case of expert and experienced senior surgeons. Thus tension free inguinal mesh hernioplasty continues to be the ideal surgical repair for inguinal hernias given the use of proper and efficient tissue handling and surgical technique.

6. Future Scope

As per the conclusions drawn form our study tension free inguinal mesh hernioplasty continues to be the ideal surgical repair for inguinal hernias due to the statistically

insignificant observations and results drawn from this study. But we can rely on Color Doppler scrotum and Semen analysis as investigations to look for any suspected inguinal vasal obstruction or trauma to vas or other spermatic cord structures during hernia repair.

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