

OPEN INGUINAL HERNIA REPAIR BY MOSQUITO NET MESH: A FIVE YEARS RETROSPECTIVE STUDYAnil Darokar¹, Kishor Bele², Rajiv Mulmule³, Rizwan Qazi⁴**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: In inguinal hernia tension free hernioplasty using polypropylene mesh by Lichtenstein and Schulman's method is accepted all over the world. But cost of the mesh is a major contributor to the cost of repair in rural India. A retrospective study of 105 Inguinal hernia operated patients from 1st March 2007 to 30th October 2011 was undertaken to evaluate efficacy and cost benefit of Mosquito Net Mesh (MNM) as against conventional mesh repair. All patients were operated under spinal anaesthesia. The ETO sterilized MNM of size 7.5cm by 13cm was used for repair. The incidence of complications, recurrence and cost benefit was investigated after a mean follow up of 37 months. The rate of seroma formation (n=0), hematoma formation (n=0), superficial infection in the form of erythema (n=3), serous discharge after stitch removal (n=7), chronic pain (n=4) and recurrence (n=2) were low. The cost benefit was 40% - 50% of the total cost of the repair by using MNM. ETO sterilized MNM forms a cheap, safe and efficient alternative to the conventional and costly polypropylene mesh in open tension free repair of inguinal hernia in adults.

KEYWORDS: Hernia, Mesh repair, Hernioplasty, Mosquito net cloth

INTRODUCTION: Inguinal hernia repair is one of the most common surgical procedure performed in general surgery.⁽¹⁾ Tension free hernioplasty using prosthetic mesh popularized by Lichtenstein and Schulman is the method of choice in open inguinal hernia repair all over the world. It uses polypropylene mesh to support the inguinal muscular layer. Polypropylene satisfies all the requirements of an ideal mesh and therefore 'prolene mesh' today is the best material available.^(2,3)

But cost of the mesh is the major contributor in open mesh repair in rural India. In most of the centers even in urban India, where the health services are provided at minimum cost or free of cost, the burden of non-lifesaving drugs and implants like mesh are borne by the patient. Hence any reduction in cost of the mesh makes it substantially easy for the patient as well as the health service provider. Hence a search was made by Indian surgeon, Brahmma Reddy, Kurnool (A.P.) in 1996 for cheap and suitable material. He found mosquito net cloth as a suitable material and started using it in open hernia repair since then.

The Indian surgeons Reddy B.V. and Tongaonkar must be credited for popularizing this novel concept of using Mosquito Net Mesh (MNM) in open inguinal hernia repair in India. Similar studies using MNM have been conducted in parts of Africa⁽⁴⁾ and have endorsed the use of locally available MNM as an effective alternative.

Both clinical and experimental evidence⁽⁵⁾ support the use of indigenous MNM to augment the repair of inguinal hernia to achieve results similar to those of commercial meshes.

This is a retrospective study evaluating efficacy and cost of MNM as against conventional mesh repair.

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OBJECTIVE: The objective of the present retrospective study was to evaluate the safety, complications and recurrence rate of Lichtenstein tension free repair using Mosquito Net Mesh and compare the cost benefit with conventional standard mesh repair.

PATIENTS AND METHODS: Data of patients with inguinal hernia who were operated between 1st March 2007 and 30th October 2011 using ETO sterilized Mosquito Net Mesh in Dr. P. D. M. Medical College, Amravati is retrospectively analyzed. 105 patients of Inguinal hernia underwent Lichtenstein tension free repair using ETO sterilized Mosquito Net Mesh of size 7.5cms x 13cms.

All the patients were male (105), with mean age of 57 years, Range (18years to75years).

The surgical procedure was done under spinal anesthesia.

The data is collected from the surgical registry of Dr. Panjabrao memorial medical college, Shivaji Nagar, Amravati, Pin - 444603 Maharashtra, India.

RESULTS: Distribution of Age, and hernia type.

	n = 105
Mean age	57 (18yrs-75yrs)
<20	8 (7.62%)
21-30	8 (7.62%)
31-40	7 (6.67%)
41-50	16 (15.24%)
51-60	19 (18.10%)
61-70	27 (25.71%)
71-80	20 (19.05%)
M: F	105: 0
Right	64 (60.95%)
Left	26 (24.76%)
Bilateral	15 (14.29%)
Reducible	90 (85.72%)
Obstructed	15 (14.29%)
Obstructed reduced by taxis	7 (6.67%)
Obstructed subjected to emergency repair	8 (7.62%)

Table 1

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Duration of swelling:

0 - 2Months	7 (6.67%)
>2 - 4 Months	4 (3.81%)
>4 - 6 Months	8 (7.62%)
>6 - 12 Months	24 (22.86%)
>1yr - 2 years	33 (31.43%)
>2yrs - 3 years	7 (6.67%)
>3yrs - 4 years	8 (7.62%)
>4yrs - 5 years	3 (2.86%)
>5yrs -10 years	6 (5.71%)
>10 years	5 (4.76%)

Table 2

Pain in groin intermittent	77
Pain in abdomen	5
Lower urinary tract symptoms	7
Cough	6
Constipation	2

Table 3: Associated complaints

Hypertension	11
Diabetes mellitus	2
Cardiomyopathy	9
Past history of tuberculosis (treated)	5
Chronic Bidi smoker	6
Tobacco chewer	3
Pneumonia	2
Associated hydrocele	8

Tale 4: Associated diseases and co-morbid conditions

Brand	Cost of mesh size 7.5 cm by 15cm
Prolene(J & J) hernia mesh kit	Rs. 1935
Centennial	Rs. 946
Trulene sutures (India)	Rs. 850
Fine surgical	Rs.1018
Mosquito Net Mesh	Rs.20

Table 5: Average cost of the mesh during study period

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Cost is currency value and market forces dependent. 105 patients were operated by Lichtenstein tension free repair using Mosquito Net Mesh. All patients were male (105). Age ranged from 18 – 75 years with a mean of 57 years. 90 (80.72%) patients had unilateral and 15 (14.29%) patients had bilateral hernia. 15(14.29%) patients presented with obstructed hernia all were unilateral hernia cases), of which 7 were relieved by taxis and operated electively whereas remaining 8 (7.62%) underwent emergency hernia repair.

All the patients (including bilateral hernia with mesh on either side) were operated under Spinal anesthesia. ETO sterilized Mosquito Net Mesh of size 7.5cms by 13cms was used. Four point fixation of the mesh was done. Laterally two points to the inguinal ligament 3 to 4 cms apart and medially one to anterior rectus sheath and other to the conjoint tendon. Depending upon the huge size of hernia and thick sac adhesions to the cord structures orchidectomy was performed in 9(8.57%) patients. Inguinal nerves were sacrificed in additional 3 patients. Associated hydroceles were operated in the same sitting. Average hospital stay of patient was 7 days.

All electively operated patients received Inj. Ceftriaxone 1 gm I.V. 30 minutes before induction of anesthesia.

Doses of antibiotics received:

Inj Ceftriaxone 1gm I.V.

Doses	No. of patients
1	97
6	8(emergency operated patients)

Inj Amikacin 500mg I.V.

Doses	No. of patients
6	3(emergency operated pts)

8 emergency operated patients were given 6 doses of Inj. Ceftriaxone 1gm I.V. 12 hourly. 3 patients of emergency additionally received 6 doses of Inj. Amikacin 500 mg. I.V. 12 hourly. These 3 patients were having dark coloured fluid in hernia sac and loop of small intestine and/or omentum were highly congested without evidence of ischemia.

Inj. Diclofenac aqueous 75mg. I. M. was given as analgesics depending upon pain severity on demand by the patient.

7(6.67%) patients did not need injectable analgesia. 39(37.14%) patients needed single dose whereas 34 (32.38%) patients needed 2 doses of injectable analgesia. More doses were needed in bilateral hernia and emergency operated patients. Orally Paracetamol 500mg + Ibuprofen 600mg was given for 48 – 96 hours to all patients.

Post-operative complications encountered are given below. Follow up period was between 12months to 67 months with mean of 37 months.

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Retention of urine	17 (16.19%)
a) Emergency surgery	8/8 (100%)
b) Elective surgery	9/97 (9.28%) bilateral -6 and unilateral -3
Hematoma	0 (0 %)
Serous discharge	7 (6.67%)
Seroma	0 (0%)
Infection	(2.86%)
a) Superficial (erythema)	0 (0%)
b) Deep	0 (0%)
Stitch abscess	0 (0%)
Mesh rejection	0 (0%)
Chronic pain	4 (3.81%) dull ache
Recurrence	2 (1.90%)

Table 06: Post-operative complications

4 patients died in follow up period due to other medical causes.

7(6.67%) patients presented with serous discharge from wound at the time of stitch removal with partial wound gaping but were managed with dressing. Serous discharge was <5cc in 6 patients and about 8-10cc in 1 patient. Discharge disappeared in 2 to 5 dressing and all wounds healed well within 5 to 9 days of stitch removal.

3(2.86%) showed superficial infection in the form of erythema. Deep infection and stitch abscess was not seen in single case.

MNM rejection rate was 0%.

Chronic pain in groin was present in 4 (3.81%) patients. It was of dull ache type and bearable. Pain relieving drugs were not needed.

2(1.90%) patients presented with recurrence, one after 6month of surgery whereas other after 7 months (bilateral hernia operated patient developed recurrence on one side) of surgery.

DISCUSSION: Inguinal hernia surgery is one of the most commonly performed surgeries the world over.⁽¹⁾ There is almost unanimity regarding the efficacy of tension free mesh repair of the posterior wall of inguinal canal by Lichtenstein and Schulman's method of open inguinal hernia repair. It is easy to perform, easier to master even for trainee surgeons and has very low recurrence rates,^(6, 7, 8) complications rates are also low and early return to activity with minimum pain and discomfort is the norm, but standard mesh comes at a cost.

In a developing country like India health services are provided in most rural and semi-urban areas by government agencies or local bodies. Majority of population is still based in rural areas. Most of the health service providers in these areas, like the institute of the present study, provide health care either at subsidized cost or totally free of cost.

But in almost all cases, the cost of non-lifesaving drugs and implants needed for surgery is borne by the patient. The commercially available mesh used in Lichtenstein repair (Prolene) is costly.⁽¹⁾ Cost of the mesh ranges from Rs. 850 to Rs. 1400. The cost of mesh constitutes 40% to 50% of the cost of repair (excluding hospital expenses). (Table - 06). The cost of 7.5cm by 15cm MNM is Rs.20/ 40cents. Cost of the material and drugs including anesthetic drugs required for surgery (excluding cost of the mesh) ranges from Rs. 1200 to Rs. 1500.

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If the cost of mesh is not borne by the patient, then it results in non-mesh repairs being used by default. This not only leads to higher recurrence rates but also in loss of productivity. This has been explicitly calculated and reported by 'Brian Stephanson and Andrew Kingsnorth in their study in Africa.⁽⁴⁾ This led to the use of cheap, easily available Mosquito net mesh cloth (MNM) being used by Tongaonkar and B V Reddy.⁽⁹⁾

This retrospective study evaluates the safety, complications and recurrence rates using MNM in open inguinal repair. In the present retrospective study 7.5 cm by 13 cm ETO sterilized MNM was used for open tension free (Lichtenstein) repair of inguinal hernia in 105 patients with maximum 5 years follow up (mean 37months). In the present study after 5 years follow-up, there was rejection rate which compares well with Lichtenstein study and Tongaonkar study.^(9, 10)

The recurrence rate in this series was 1.9%. In Lichtenstein series, the recurrence rate was <1% to 5 %.^(6, 7, 8) In Tongaonkar and B V Reddy's series of 359 patients the recurrence rate was 0.27% using MNM.⁽⁹⁾

The incidence of superficial infection in this series was 2.86% with no deep infection or mesh rejection. In Tongaonkar and B V Reddy's study, the minor infection rate was 4.7 %⁽⁹⁾ and it was 7% in Brian Stephensons series⁽⁵⁾ which also used MNM for hernia repair in Africa.

There was no incidence of hematoma formation in this study as against 3 cases out of 359 in Tongaonkar and B V Reddy's series.⁽⁹⁾

This study did not have any seroma formation. There was 3.81% incidence of chronic mild groin pain which did not need any analgesics or further treatment. There was 94.28% subjective satisfaction with the repair using MNM in this study.

CONCLUSION: ETO sterilized MNM forms a cheap, safe and efficient alternative to the conventional and costly Prolene mesh in open tension free repair of inguinal hernia in adults. This retrospective study makes a strong case of MNM being officially endorsed for use by health service providers in all resource scarce societies and developing countries.

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