Original Article

Polyester Mosquito Net Mesh for Inguinal Hernia Repair: An Alternative to Commercial Polypropylene Mesh in Resource Limited Settings

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Abstract:

Background:
Inguinal hernia is one of the common surgical problems in our country having significant morbidity and mortality. The gold standard of treatment of inguinal hernia is Lichtenstein tension free mesh repair using polypropylene mesh worldwide. High costs of polypropylene mesh have limited its use in less economically developed areas. Sterilized polyester mosquito net mesh is low cost and readily available. In resource limited settings sterilized polyester mosquito net may be a suitable alternative of synthetic polypropylene mesh.

Methods:
A prospective study was carried out from January 2019 to January 2020 at Department of Surgery (Unit-lll), Rangpur Medical College Hospital, Rangpur, Bangladesh. A total 38 patients of uncomplicated inguinal hernia were operated by Lichtenstein tension free technique using sterilized polyester mosquito net. Complicated hernias and patients below 18 years were excluded. Fiber composition was tested in laboratory before use. Sterilization was done by autoclave technique. Patients were assessed post-operatively for wound infection, hematoma formation, chronic pain and recurrence of hernia. The patients were followed up for the next 12 months.

Results:
A total 38 patients had tension-free repair of their inguinal hernias by using non-insecticide impregnated polyester mosquito net mesh. The median age of the patients was 42.9 years. All were male patients. Seroma formation was in 07.89% and wound infection was in 05.26% cases. Every piece of mosquito net costs of only 05 BDT or less. No patient reported of long term wound pain. There was no rejection and recurrence of hernia.

Conclusion:
Sterilized polyester mosquito net is a suitable low cost alternative to synthetic polypropylene mesh. It can be used in resource limited settings rather using traditional Bassini technique.

Key words: Inguinal Hernia, Polyester mosquito net

Introduction:

Inguinal hernia is common among the surgical diseases worldwide with variable incidence and prevalence. Globally the most commonly performed surgical operation is inguinal hernia repair[1]. Among the abdominal operations; inguinal hernioplasty accounts for 10-15% of general surgical operations[2]. When not repaired electively it is associated with adverse outcome and a mortality rate of 5.3-40%[3]. Lichtenstein theorized that the prime cause of recurrence of inguinal hernia is the approximation of normally unopposed tissue that creates a tension which is a clear violation of basic surgical principle[4]. This tension can be avoided by using mesh prosthesis to bridge the hernia defect without distortion of normal anatomy and results in a less painful operation and lower recurrence rate[4,5]. The polypropylene mesh material was ideal for hernia operation over half a century ago[6]. The scarcity and expensive nature of synthetic polypropylene mesh is the cause of performing traditional Bassi-

ni technique in most centers of less economically developed areas till now[2]. Implanted pieces of mosquito net cloths create an inflammatory reaction on mice comparable to the most sophisticated polypropylene meshes[7]. Sterilized mosquito net mesh may be a low-cost alternative in less economically developed countries as an easily accessible substitute[8].

We demonstrate our experience with the use of sterilized polyester mosquito net as mesh for tension-free repair of inguinal hernia; its effectiveness and safety in elective inguinal hernia surgery.

Methods:

A prospective study was carried out from January 2019 to January 2020 at Rangpur Medical College Hospital, Rangpur, Bangladesh. All patients having unilateral/ bilateral, direct/ indirect, reducible/ irreducible, primary hernia and over eighteen years of age were included. Patients with strangulated hernia, recurrent hernia, below eighteen years of age and who were not willing for mosquito net repair were excluded. All routine investigations for pre-anesthetic check-up were done for every patient. Informed written consent was obtained from patients fulfilling the selection criteria. A data collection sheet was designed and the surgeon completed this for each inguinal hernia repair using a sterilized mosquito net mesh. Fiber composition of mosquito net was tested in laboratory that revealed 100% polyester. Sterilization was done by autoclave. Sample from all sterilized mosquito net was sent to microbiology department to see any growth of microorganism. Sterilized, non-insecticide impregnated 100% polyester mosquito net mesh was used for hernioplasty by Lichtenstein technique under spinal anesthesia. Preoperative intravenous ceftriaxone one gram was given and continued daily up to third post-operative day followed by oral cefixime two hundred mg BID for next five days. The wounds were usually inspected on the fourth postoperative day. All the patients were discharged to home on fifth post-operative day except those developed seroma and superficial surgical site infection. The patients were followed up postoperatively for complications such as pain, seroma formation, wound infection, rejection, and recurrence after discharge. Patients were followed up physically at one month, six months and one year interval. Basic statistical analysis including age distribution, frequencies and percentages were computed using SPSS version 16.0 for windows. The results are presented in text, tables and figures.

The chemical composition of mosquito net was tested by TUV SUD Bangladesh Pvt. Ltd. Update Tower, Level 7 & 8, 01 Shahjalal Avenue, Uttara, Dhaka. The test was done on 28/01/2021 and revealed polyester.

Ethical Issue:

Written permission was taken from Principal, Rangpur Medical College prior to conduct the study.

Results:

Of the 38 patients all were male. 36 patients (94.74%) had unilateral hernia of which 04 were irreducible (10.53%). 02 patients (05.26%) had bilateral hernia but reducible. Direct and indirect hernia was present in 08 patients (21.05%) and 30 patients (78.95%) respectively. Patients presented with reducible hernia were 34 in number (89.47%). (Table-I)

Table-I: Distribution of hernia type (n=38)

Type of hernia	Number of patients (%)
Unilateral	36 (94.74%)
Bilateral	02 (05.26%)
Direct	08 (21.05%)
Indirect	30 (78.95%)
Reducible	34 (89.47%)
Irreducible	04 (10.53%)

Majority (27 patients) of the patients (71.05%) were in age range of 31 years- 50 years. 04 patients (10.53%) were in age range of 19 years – 30 years, 06 patients (15.79%) were in 51 years- 70 years and 01 patient (02.63%) was in age group of above 70 years. (Table-II)

Table-II Age distribution of patients (n=38)

Age range	Number of patients (%)
19 years-30 years	04 (10.53%)
31 years- 50 years	27 (71.05%)
51 years- 70 years	06 (15.79%)
>70 years	01 (02.63%)

In this study seroma formation was 07.89% and wound infection was 05.26%. All of the cases were treated by regular wound dressing and antibiotic coverage. There was no chronic pain, rejection or recurrence. (Table-III)

Table-III Post-operative complication (n=38)

Complications	Numbers
Seroma formation	03 (07.89%)
Wound infection	02 (05.26%)
Chronic pain	00 (00.00%)
Rejection	00 (00.00%)
Recurrence	00 (00.00%)

The commercially available polypropylene mesh sized 7.6Ч15cm costs of 750 BDT or more. The same sized mosquito net costs 05 BDT or less (Table-IV).

Table-IV Cost of mesh

Brand	Size	Price
Ethicon soft	7.6Ч15cm	1750 taka
Ethicon	7.6Ч15cm	750 taka
Paha	7.6Ч15cm	950 taka
Mosquito net	7.6Ч15cm	<5 taka

In this study seroma formation was 07.89% and wound infection was 05.26%. All of the cases were treated by regular wound dressing and antibiotic coverage. There was no chronic pain, rejection or recurrence. (Table-III)

Discussion:

Inguinal hernia surgery is one of the most commonly performed surgeries all over the world. Tension free mesh repair of the posterior wall of inguinal canal by Lichtenstein is easy to perform and has very low recurrence and complication rates along with early return to activity with minimum pain and discomfort[9-11]. This study demonstrates our experience with the polyester mosquito net as mesh in the repair of inguinal hernia in elective situations. Our study showed the material was effective, low cost and linked to minor wound complications.In case of herniorrhaphy by polyester mosquito net; post-operative seroma occurred in 07.89% of our patients and 05.26% of the patients had minor surgical site infections associated with discharge of pus. These were treated with antibiotic and wound dressing but delay the return to home of the patients on an average of 5 to 7 days. We did not have to remove the mesh. No rejection of mesh or recurrence was recorded during the one year study period.Previous study on the use of mosquito net mesh showed wound infection rate of 2% to 4.7%[12,13], hematoma of 4%-5%[13,14], recurrence of 0.3%[12] and no rejection of prosthetic material.The complication rates of our study subjects were similar when compared with results from authors who used standard commercial polypropylene mesh where no major complications except for hematoma formation in 6.9% and recurrence rate of 0.6%[15-18] was observed.Also the clinical effectiveness of polyester mosquito net for hernioplasty is not in doubt. A randomized double blind study in Burkina Faso showed that there was no significant difference in the short term clinical outcome of hernia treatment or surgeon's comfort in handling the mosquito net mesh and the commercial polypropylene mesh[8]. Another study showed that the use of mosquito net prosthesis in hernia as a mesh has long term safety and efficacy, provided it is adequately sterilized[19]. The nylon mosquito net is made of material similar to the nylon suture which has been used by practicing surgeons in herniorrhaphy, especially in Africa, for many years[8,20,21,22]. Surgeons who would wish to use these affordable sterilized mosquito net meshes should comply with international quality assurance and sterility standards[8,23]. The method of sterilization of mosquito net mesh is a great issue. We used the method of autoclave and for sterilization. Microbiological examination of the autoclaved samples shows no growth of microorganism.Previous study shows that the copolymer mosquito mesh maintained its texture and pliability when sterilized at 121ºC for approximately 20 min[24]. The cost of commercially available mesh sized 7.6Ч15 cm in Bangladesh ranging from 750 BDT – 1750 BDT or more. We use the same sized mosquito net that costs only 5 BDT or less.Previous study shows; the cost of locally made individual 10Ч15 cm mosquito net costs US$ of 0.0043- 0.014 and cost of sterilization and packaging was US$ 1.46 per mesh[8,13].

Conclusion:

In context of our country polyester mosquito net as mesh is a suitable material for the repair of

groin hernias. It is effective, cheap and is associated with minor wound complications. Wider use of this material in less economically developed countries may be suggested as the commercial polypropylene mesh is expensive and unaffordable for many of the patients.

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