

Mesh implant in abdominal wall hernia repair: analysis of outcomes and factors that influence its acceptance in a low medium income country

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Abstract

Background: Globally, mesh repair of abdominal wall hernias has become the gold standard due to lower recurrence and earlier return to normal activities. The aim of this study is to document the spectrum and factors that determine mesh acceptance for abdominal wall hernias in our institution.

Patients and Method: This was a prospective study of adult patients with adverse hernia characteristics like voluminous sizes ≥ 4 cm, recurrence or multiple hernias of any sizes recruited over a period of seven years. Emergency cases, those with advanced abdominal malignancies or who declined inclusion in the study were excluded.

Results: A total of 440 patients with hernias that have one or more of the following characteristics: voluminous, recurrent, bilateral or incisional hernias were recruited and comprised 298 (67.7%) males and 142 (32.3%) females. Majority (203, 46.1%) had inguinal hernia, followed by incisional hernia (112, 25.5%). Overall acceptance rate was 57.0%. The relative rate of mesh acceptance was highest among patients with incisional hernia (90, 80.4%) followed by inguinal hernia (122, 60.1%). Indeed, 71.1% of the 142 females counseled for mesh implant accepted it compared to 50.3% recorded for males. The main independent factors that influenced mesh acceptance rates were hernia recurrence ($p=0.002$), hernia defect ≥ 5 cm ($p=0.001$), hernia being incisional or inguinoscrotal/inguinolabial in type (0.006), financial impediments ($p=0.031$) and socio-cultural barriers ($p=0.020$).

Conclusion: Despite hernia complexity with increased risk of repair failure after suture-based repair, a significant proportion (43.0%) of patients with the above hernia types still do not accept mesh implants in our environment. Acceptance of mesh was predicated on sex, hernia type and size, previous recurrence, financial capacity and socio-cultural barriers.

Keyword: Mesh acceptance, abdominal hernia, morbidity, recurrence

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Résumé

Contexte : Universellement, la réparation par maille des hernies de la paroi abdominale est devenue l'étalon-or en raison d'une récurrence plus faible et d'un retour plus rapide aux activités normales. Le but de cette étude est de documenter le spectre et les facteurs qui déterminent l'acceptation de la maille pour les hernies de la paroi abdominale dans notre institution.

Patients et méthode : Il s'agissait d'une étude prospective de patients adultes présentant des caractéristiques herniaires indésirables telles que des tailles volumineuses ≥ 4 cm, des récurrences ou des hernies multiples de toutes tailles recrutés sur une période de sept ans. Les cas d'urgence, ceux avec des tumeurs malignes abdominales avancées ou qui ont refusé l'inclusion dans l'étude ont été exclus.

Résultats : Un total de 440 patients présentant des hernies présentant une ou plusieurs des caractéristiques suivantes : des hernies volumineuses, récurrentes, bilatérales ou par incision ont été recrutés et comprenaient 298 hommes (67 ; 7 %) et 142 femmes (32,3 %). La majorité (203 ; 46,1 %) avait une hernie inguinale, suivie de l'hernie par incision (112 ; 25,5 %). Le taux d'acceptation global était de 57,0 %. Le taux relatif d'acceptation de la maille était le plus élevé chez les patients souffrant d'une hernie par incision (90 ; 80,4 %), suivi de l'hernie inguinale (122 ; 60,1 %). En effet, 71,1% des 142 femmes conseillées pour l'implant de la maille l'ont accepté contre 50,3% enregistrés pour les hommes. Les principaux facteurs indépendants qui ont influencé les taux d'acceptation de la maille étaient la récurrence de l'hernie ($p = 0,002$), le défaut de l'hernie ≥ 5 cm ($p = 0,001$), l'hernie étant en type par incision ou inguino-scrotal/inguino-labial (0,006), les obstacles financiers ($p = 0,031$) et les barrières socioculturelles ($p=0,020$).

Conclusion: Malgré la complexité de la hernie avec un risque accru d'échec de la réparation après une réparation à base de suture, une proportion importante (43,0 %) de patients atteints des types d'hernie ci-dessus n'accepte toujours pas les implants de maille dans notre environnement. L'acceptation de la maille était fondée sur le sexe, le type et la taille de l'hernie, la récurrence précédente, la capacité financière et les barrières socioculturelles.

Mot clé : *Acceptation de la maille, hernie abdominale, morbidité, récurrence*

Introduction

Although surgery has long been considered an essential component of health system, sadly, it has also been one of the most neglected parts of global health initiatives especially in developing nations [1]. It is estimated that two billion people, namely those living below the poverty line in low and middle-income countries (LMICs), continue to lack access to essential surgical care [1]. Over the years, the search for ideal hernia surgery continues to draw attention of surgeons, patients and relevant industry; fortunately, this industry has played a major role in advancing the technology to perfect the performance of hernia repair [2].

Evidence for the efficient repair of abdominal wall hernias using a prosthetic mesh in terms of recurrence was found to be robust.[2,3] In the past, many of these hernias were repaired using anatomic methods, but the techniques were fraught with complications like haematoma, stitch sinus, infection, high recurrence rates and flap necrosis [4] For incisional hernias, these complications occurred in 10-44% of repairs, with rates of recurrence quoted as 11-52%. [4] These high recurrence rates prompted recommendations of “a cautious attitude to surgical treatment of abdominal wall hernias” in the mid-1980s and led to the widespread acceptance of mesh repair [3-6] In the industrialized nations, mesh repair of abdominal wall hernias has become more attractive, because of lower recurrence rates and earlier return to normal activities especially when laparo-endoscopic approach is utilized [4,7].

Surprisingly, the story of the evolution of surgical treatment of abdominal wall hernias in most African communities has been different, with the vast majority of cases still being repaired by the open, suture-based methods [8-10].

In Ibadan, Southwest Nigeria, an audit of 922 inguinal hernias (including 343 complete inguino-scrotal hernias) and 110 incisional hernias revealed that an overwhelming majority of these hernias were repaired in the modified-Bassini fashion and other tissue-based anatomic approaches [7]. Indeed, only 5% of the inguinal hernias and 31.0% of the incisional hernias were repaired with mesh; all 78 umbilical hernias were repaired anatomically by suture-based techniques. The reasons for low utilization of prosthetic meshes in that series, despite the large sizes of the hernias included non-availability and high cost of the mesh materials as well as ease of training in the more affordable anatomic procedures [7]. The

above report encapsulates the state of the art in most African literatures as similar accounts have been cited by Ohene-Yeboah and Abatanga in Ghana, Ogbuanya and Emedike and Mba both in Nigeria, Mabula and Chalya in Tanzania and Patel *et al* in Sierra Leone [8,9,11-13]

Regrettably, available data from published clinical studies indicate that African hernias attain the size of human head, and have been described by an assortment of names including African puzzles, giant hernias and complex hernias [8,11,14,15]. These hernias are of particular concern not only for the high recurrence rates, but more importantly the adverse post-operative complications that may occur after repair namely entero-cutaneous fistula, sepsis, bleeding, cardio-respiratory and urogenital sequelae [8,11,14].

The huge unmet needs of abdominal wall hernias in LMICs have been highlighted, but human and technological resources to tackle them are scarce and diminutive [1,8,16]. Indeed, hernia repairs have been shown to be as important a public health investment as insecticide-treated bed nets for malaria, anti-retroviral therapy for HIV/AIDS (Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome) or directly observed therapy for tuberculosis [16]. Yet, the commercial hernia meshes are not provided to LMICs at a reduced cost as practiced for interventions and pharmaceuticals for HIV/AIDS, tuberculosis or malaria [16]. This has led surgeons in most LMICs including sub-Saharan Africa to continue the use of tissue-based methods to repair hernias despite documented high treatment failures associated with these techniques [8,16,17].

However, tension-free repair of hernias in the contemporary time is supported by strong evidence of superior outcomes in majority of cases compared with non-mesh repairs [16,17] Before selecting prosthetic implants for an individual patient, a surgeon must take into account patients' characteristics (such as age, defect size, obesity, underlying disease process) and mesh properties to determine how best to approach treatment.[6,16,17] From the foregoing, abdominal wall hernias in our setting are peculiar and to say the least, epidemiologically and structurally more deserving of prosthetic mesh reinforcement. Curiously, though unfortunately, the protracted predilection for suture-based, anatomic techniques has persisted in our practice and this is most worrisome. The aim of this study is to analyze factors that influence mesh acceptance rates and document outcomes of both mesh and suture-based repair methods in our setting.

Patients and method

Design and Setting

This study was a prospective study involving all consecutive patients with large, recurrent, bilateral or multiple abdominal wall hernias recruited over a seven-year period from January 2013 to December 2019. The patients were managed at a tertiary health institution.

Subjects

Traditionally, we select patients for mesh implants in our unit. Due to high cost and frequent unavailability of prosthetic meshes in our hospital, only patients with large bubunocoles, inguino-scrotal or inguino-labial hernias, bilateral hernias, recurrent hernias of any size, incisional, multiple abdominal wall hernias and large (≥ 4 cm defect) midline (umbilical, paraumbilical, epigastric) hernias were primarily scheduled for mesh repair.

All adult (≥ 16 years of age) patients with the above hernia types were included in this study. Patients with obstructing or strangulating hernias, massive ascites, chronic debilitating illness, evidence of active abdominal wall or intra-peritoneal sepsis and metastatic abdominal visceral or wall malignancies were excluded from the study. Informed consent was obtained from all the patients before commencement of the study.

Procedure

All consecutive adult patients presenting with abdominal wall hernias (irrespective of clinical characteristics) during the study period were initially evaluated clinically. Only those that fulfilled the inclusion criteria were finally recruited into the study. At the specialist hernia clinic of our centre, each of the 440 selected patients was interviewed and the socio-demographic and relevant clinical details were extracted and entered into a standard proforma. The patients were similarly examined taking note of the hernia size, location, bilaterality, multiplicity or presence of obesity and factors contributing to raised abdominal pressure like ascites, bladder outlet obstruction, intra-abdominal masses and respiratory diseases. All the recruited patients were counseled for mesh hernia repair. Explanations on the additional cost of mesh, benefit of mesh placement and possible post-operative complications. Those who declined mesh repair were noted and their reasons for decline recorded.

Informed consent for surgery (whether suture-based or mesh repair) was obtained from all the patients before repair. Pre-operatively, anemia was corrected in those with haemoglobin less than 10.0g/dl, all active infections treated and prophylaxis

started for those at high risk of developing deep venous thrombosis (DVT). All the patients received prophylactic antibiotics at the time of induction of anaesthesia. For patients that received mesh implants, open onlay method was used. The mesh repairs in patients with inguinal hernias were done in the Liechtenstein fashion. For the anatomic repairs, appropriate surgical technique was performed. Tube drain was inserted in majority of the mesh repairs with extensive tissue dissections. Skin sutures were removed on the 12-14th postoperative day. Follow up visits were discussed and ranged from six to 44 months. First visit was two weeks after skin suture removal, then monthly for three months and three monthly for nine months. Subsequently, follow up visits were scheduled every six months. During follow up visits, patients were interviewed and examined, taking note of presence of wound infection, haematoma, epididymorchitis, wound dehiscence and recurrences. Those that failed to attend clinic in two consecutive occasions were interviewed through telephone lines and a new date for clinical assessment arranged.

Data analysis

Data obtained were analyzed using Statistical Package for Social Sciences (SPSS) software version 22.0 (IBM, Chicago, IL, USA, 2015). Descriptive statistics were employed to calculate categorical variables like percentages. The results were presented in tables. Mean and standard deviation were used to summarize continuous variables. Where appropriate, test for the level of significance of the variables was done. Confidence interval was calculated at 95% level and significance at 5% probability level ($P < 0.05$).

Ethical approval

The proposal for this study was approved by the research and ethical committee of our hospital before commencement of the study. All ethical principles relating to studies on human subjects were observed during the study period.

Results

Patients' characteristics

During the period of study, 620 patients with abdominal wall hernias were seen, but only 71.0% (440) of them fulfilled the inclusion criteria and were further evaluated. The 440 patients formed our study population. The ages of the patients ranged from 18-84 years with a mean of 45.89 +/- SD 15.86. There were 298 males and 142 females, giving a male to

female ratio of 2:1 (Table 1). Majority were farmers (130, 29.5%), followed by artisans (101, 23.0%). Others were traders (64, 14.5%), civil servants (44, 10.0%), professionals (31, 7.0%) and others (70, 15.9%). Majority (296, 67.3%) were rural or semi-urban dwellers.

Table 1: Age and sex distribution of patients

Age range (years)	Male	Female	Total	Percent (%)
16-19	8	2	10	2.3\
20-29	35	21	56	12.7
30-39	76	30	106	24.1
40-49	64	36	100	2.7
50-59	45	28	73	16.6
60-69	40	15	55	12.5
70-79	24	10	34	7.7
80-89	6	0	6	1.4
Total	298	142	440	100.0

Clinical presentation

Over two-third (312, 70.9%) had lived with their hernias five years or more before presentation to the specialist hernia clinic. Less than a tenth (36, 8.2%) presented within six months of noticing the hernia. Majority (203, 46.1%) of the patients had inguinal hernia followed by incisional hernia (112, 25.5%). The least frequent was femoral hernia (3, 0.7%) as shown below (Table 2).

Table 2: Acceptance rates for mesh implants

Hernia type	Frequency	Mesh acceptance rate (%)
Inguinal	203	122 (60.1)
Incisional	112	90 (80.4)
Umbilical	53	13 (24.5)
Paraumbilical	47	18 (38.3)
Epigastric	18	6 (33.3)
Spigelian	4	2 (50.0)
Femoral	3	0 (0.0%)
Total (%)	440 (100.0)	251 (57.0)

Determinants of mesh acceptance

Majority (94, 37.5%) of the mesh repairs were performed in the last (2019) year of the study; followed by 66 (26.3%) in 2018. However, the rate of anatomic repair in our unit declined progressively as follows: 72 (38.0%) were repaired in 2015, 54 (28.6%) in 2016, 30 (15.9%) in 2017 and 21 (11.1%) in 2018 and 12 (6.3%) in 2019. The highest rate of utilization of mesh implants was seen among patients with incisional hernia (80.4%) followed by inguinal

hernia (60.5%) as shown below (Table 2). All the femoral hernias were repaired without mesh despite their large sizes and high risk of suture-based repair failure. Several factors influenced the utilization of mesh ranging from socio-demographic factors (income status, age and sex) to clinico-pathologic parameters like hernia type, size of hernia, recurrence status and bilaterality of groin hernias (Table 3).

In the 189 patients that had their hernias repaired by anatomic suture-based method, main reasons expressed for not accepting mesh implants were financial impediments (77, 40.7%), fear of mesh or foreign body being implanted permanently in their bodies (44, 23.3%), other socio-cultural barriers (29, 15.4%), mixed factors (32, 16.9%) and no/unexpressed reasons (7, 3.7%).

Outcomes of surgical repair

The overall morbidity and wound infection rates were 18.2% and 3.4% respectively. Morbidity rates for both treatment groups were comparable ($p=0.422$). However, the rates of wound infection, visceral injury and seroma were slightly higher in the mesh group, though there was no significant statistical difference for these variables in the two repair groups. There was no mortality recorded during the study (Table 4). In the suture-repair group, six recurrences were recorded during follow up. The clinical characteristics of the six patients and their hernias are shown below (Table 5).

Discussion

Approximately two thirds (67.7%) of the patients evaluated in this series were males selected on the bases of large sizes, recurrent states or multiplicity of their hernias. Previous studies in Nigeria [7,18] and India [5] support our findings, though Ammar and Ismail [19] found far more female preponderance for umbilical hernias in Egypt compared to other reports from Nigeria [7,14]. The reasons adduced were early marriage, multiparity and high prevalence of chronic liver disease in Egypt [19].

Overall, more than half (57.0%) of the patients in this series accepted mesh implants for repair of their hernias. This figure, though encouraging in resource-constrained environment, calls for re-appraisal of surgical services rendered to hernia patients in our centre and other developing countries. This is because the hernias were selected for adverse clinical characteristics that, barring the multiple barriers to the utilization of prosthetic materials in our locality (Table 3), mesh repair was the single most viable treatment approach to be

Table 3: Impact of clinicopathologic factors on mesh acceptance rate.

Parameter	Frequency	Anatomic	Mesh (%)	χ^2	p-value
<i>Age</i>					
10-39	172	79	93 (54.1)	6.42	0.072
40-69	228	81	147 (64.5)		
70-89	40	29	11 (27.5)		
<i>Sex</i>					
Male	298	158	140 (47.0)	36.2	0.012
Female	142	31	111 (78.2)		
<i>Hernia type</i>					
Inguinal	203	81	122 (60.1)	54.82	0.006
Incisional	112	22	90 (80.4)		
Others	125	86	39 (31.2)		
<i>Size of defect(cm)</i>					
0-4	52	47	05 (9.6)	96.63	0.001
≥ 5	388	142	246 (63.4)		
<i>Recurrence</i>					
Yes	89	15	74 (83.1)	76.56	0.002
No	351	174	177 (50.4)		
<i>Bilaterality (Inguinal)</i>					
Yes	20	4	6 (80.0)	12.21	0.054
No	183	77	106 (57.9)		
<i>Financial impediments</i>					
Present	204	77	127 (46.4)	43.14	0.031
Absent	236	112	124 (74.7)		
<i>Socio-cultural barriers</i>					
Present	105	73	32 (30.5)	88.63	0.020
Absent	335	116	219 (65.4)		

Table 4: Postoperative complications

Outcome measure	Anatomic repair (%)	Mesh repair (%)	χ^2	p-value
Complications				
Wound infection	6 (3.2)	9 (3.6)	17.13	0.422
Seroma	4 (2.1)	10 (4.0)		
Visceral injury	2 (1.1)	5 (2.0)		
Scrotal haematoma	4 (2.1)	7 (2.8)		
Chronic groin pain	2 (1.1)	4 (1.6)		
Prolonged ileus	6 (3.2)	8 (3.2)		
Epididymorchitis	2 (1.1)	5 (2.0)		
Recurrence	6 (3.2)	0 (0.0)		
Total	32 (16.9)	48 (19.1)		
Average LOHs (days):	2.2	3.4		
Perioperative mortality:	0 (0.0)	0 (0.0)	-	-

*LOHs= length of hospital stay.

considered in these cohorts. It is the duty of the surgeon to advocate strongly for improved access to efficient surgery (including provision of mesh implants) as part of any meaningful efforts to consolidate on the gains of improved health care delivery in LMICs [16].

Investigators in California, USA have advocated the use of sterilized mosquito net mesh (MNM) for tension-free open inguinal hernia repairs, stressing that it is an ingenious solution to a common problem driven by necessity in many LMICs [16].

Table 5: Clinical characteristics of hernias that recurred after anatomic repair

Clinical parameters	Recurrence cases (n=6)					
	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆
Age Range (years)	20-29	30-39	30-39	40-49	60-69	70-79
Sex	F	F	F	M	M	M
Type of Hernia	Inc.	Inc.	Inc.	Inc.	Ing.	Ing.
Defect size (cm)	>5	>5	>5	>5	0-4	>5
Previous Repair (Recurrence)	No	Yes	Yes	Yes	Yes	No
Postoperative wound infection	Yes	No	Yes	Yes	Yes	Yes

*R = Recurrence; † cm = centimeter; ‡ F = female; † M = male; ¥ inc. = incisional hernia; ± ing = inguinal hernia; “ > ” = greater than

One organization dedicated to performing and teaching hernia repairs in LMICs referred to as ‘Operation Hernia’, has also highlighted the safety and affordability of MNM, citing a cost of two dollars per piece, compared with surgical mesh which costs forty to fifty dollars per unit [16]. The above recommendation by the western workers [16] was born out of necessity and support an earlier observation that the unusual situation in Africa is a direct consequence of persistent underfunding and inadequate health infrastructure development, leaving the health system of most African countries weak and unable to provide for the required improvements in any aspect of the surgical needs of the people, including abdominal wall hernia repair [18].

In this survey, the highest uptake of mesh implantation was among the patients with incisional hernia (80.4%), despite the fact that more patients with inguinal hernias were selected based on the multiple prognostic indices mentioned previously. This is probably related to a cosmetic burden conferred on patients by incisional hernia, as a result of the often-extensive disfiguring appearance of these hernias. Majority of the patients with incisional hernias were females who had caesarean section or gynaecologic operations. These observations were similar to findings in Ile-Ife and Maiduguri both in Nigeria and Denmark. [20-22] Inguinal hernia, probably due to high inguino-scrotal/inguino-labial, recurrence and multiplicity rates recorded in this series, came after incisional hernia with respect to mesh repair acceptability rate (Table 2).

Another important determinant of mesh acceptability rate was age of the patients (Table 3). There is an inverse relationship between advancing age and mesh acceptance. Perhaps, younger patients demonstrated more mesh uptake due to a need for higher physical activity and quest for better cosmetic appearance. Udo and colleagues working in Uyo,

Nigeria reported on the early outcomes of prosthetic mesh repairs in 19 female patients with incisional hernias aged 30-54 years and recorded no mortality or major morbidities [23]. This observation highlights the role of relatively young age and female sex in the high uptake of prosthetic mesh for ventral hernia patients.

The size of the defect significantly affected the acceptance rate in this study. Though, more patients harbored hernias with defect sizes ranging from 5-9cm, the highest utilization of mesh implants was on those whose hernia defects were ≥ 10 cm (Table 3).

In Enugu, Nigeria, patients were selected using defect size of more than 4cm as benchmark for use of mesh [14]. It has been shown that hernias of these dimensions are considered voluminous and have higher propensity to recur after tissue-based repair [14]. The post-operative aftermaths of large hernias pose greater clinical challenge and task the valuable resources of the surgeon, patient and health institution [14,20,24]. Emegakor working in southeast Nigeria reported two cases of neglected, large incisional hernias that presented in the rare manner of gut evisceration [24]. They were successfully repaired with mesh implants [24].

Other clinico-epidemiologic parameters of the hernias that enhanced mesh acceptability were recurrence and multiplicity (bilaterality) states of the hernias. Hernia recurrence is a common sequel of tissue-based repair and given the high utilization of this method by many indigenous surgeons, it is not surprising that as many as a fifth (20.2%) of all the patients recruited in this study had recurrent hernias. Because our patients were selected using prognostic markers (for instance, recurrence status), perhaps, it explains why this value is higher than figures quoted in Ile-Ife [24] and Zaria [18] both in Nigeria, Egypt [19] and India [5]. Multiplicity of abdominal wall

hernias may be due to bilaterality of groin hernias or due to multiple midline ventral or incisional hernias. All the patients with more than one hernia were deeply concerned about the gravity of their disease and the worries created by these multiple hernias, probably influenced a positive decision and all with multiple hernias accepted prosthetic mesh implantation.

In the typical manner of the developing nations, the two major barriers to the use of mesh observed in this study were financial constraints and socio-cultural practices. Published data from several clinical studies have identified financial impediment as a common barrier against, not only prosthetic mesh utilization, but also elective repair of abdominal wall hernias in most communities across Africa.[7-9,11,12,14] In this survey, socio-cultural practices like fear of foreign bodies, ignorance, potential negative effect of mesh on pregnancy and religious abhorrence of implants imparted negatively on the rate of implant acceptability in the course of this review. Overall, these multifaceted socio-cultural parameters and financial impediments skewed the choice of many patients towards anatomic, suture-based repair. This observation may give credence to recent clamors by many workers that hernia should be included in priority global health initiative for public health diseases [1,8]. With inclusion as a public health challenge, it is hoped, that increased public health campaigns and other policy changes in the health system of most African states will encourage surgical practices in line with the global trend for safe and effective hernia repair [1,8].

Follow up of the patients was a major challenge in this study due to long distance between some patients' home and our hospital, but the use of mobile telephone to contact patients solved majority of the problems. However, during the period of follow up, the complication profile in the mesh repair group is comparable with the tissue-based repair arm except for seroma formation and recurrence rates ($P < 0.05$). All the complications were managed conservatively and no severe wound infection requiring mesh removal was encountered. The higher incidence of seroma in the mesh group have been cited earlier and considered to have resulted from increased tissue reaction to prosthetic meshes as well as exudation from extensive subcutaneous dissection [23].

The overall recurrence rate of 3.2% in the suture-based group compared with 0.0% in the mesh arm brings to fore, the inefficiency of suture-based, anatomic methods as repair options, especially for voluminous or recurrent or multiple hernias that were

neglected for long period. A striking observation was noted on the clinicopathologic and perioperative profile of the six hernias that recurred. Majority (66.7%) were incisional hernias, the rest were of inguinal (33.3%) origin. Moreover, 83.3% had defect size > 5 cm, two-third had previous repair while over four-fifth had postoperative wound infections (Table 5). The above findings are comparable with data from previous published studies [4,6,26,28-30].

The recurrence rates of 4.9% for inguinal and 9.1% for incisional hernias observed in this series are higher than rates of 2.1% for groin and 0.9% for incisional hernias quoted in Ibadan, southwest Nigeria.[7] Similarly, the recurrence rate in this study is higher than figures of 0.7% for inguinal hernia in Tanzania [12]; it is also more than rates of 4.5% and 2.3% for incisional hernias in Netherlands [25] and Maiduguri, northeast Nigeria [20] respectively.

The lower rates of recurrence observed in Ibadan, Netherlands and Maiduguri may be explained by the differences in study design as data from these studies were retrospectively collected compared to ours that were done prospectively. In Tanzania with a negligible rate of 0.7%, it is noteworthy that patients were followed up for only six months, thereby limiting the number of recurrences that were recorded in the study. However, in a similar prospective study by Agbakwuru and colleagues from a referral centre in Ile-Ife, southwest Nigeria, a recurrence rate of 9.1% for incisional hernia repair without mesh overlap with the value observed in this study. Indeed, recurrence after hernia surgery is the most important reference standard against which most hernia surgeons judge the effectiveness of a repair technique world-wide [8,26-28]. Generally, numerous controllable technical risk factors like surgical method and hospital volume and uncontrollable patient-related risk factors like hernia type, obesity and smoking have been found to be the main independent predictors of recurrence after hernia repair [26-28].

In most reported series where mesh implantation was utilized for abdominal hernia, recurrence was either very low or not recorded. Indeed, published studies on tension-free hernia repair with mesh showed low recurrence rate of 0.9% in Dakar [29] and 0.0% each in Ghana [6] and southwest Nigeria [30]. In a referral hospital in Uyo [23], Nigeria an unusually high recurrence rate of 10.5% was reported after polypropylene tensionless incisional hernia repair in 19 adult females. This high rate may be related to the following clinical and perioperative indices; 18 (94.7) repairs were performed for re-recurrence cases and 16 (82.2%)

for voluminous midline hernias [23]. Elsewhere, it has been cited that incisional hernias have predilection for midline incision (which was used to repair 16 cases) compared to other abdominal incisions and that repairs for re-recurrence are fraught with technical difficulties [26-28].

Limitations

The selection criteria excluded patients with smaller hernias who otherwise would have accepted mesh implants if properly counselled, bearing in mind that in developed economy, tensionless hernia repair with prosthetic meshes has become the standard of care for surgical repair of all hernias irrespective of size or type [2,3,16]. Payment for the mesh was 'out of pocket' by the patients and this significantly limited the proportions of patients that accepted mesh implants. There was no grants or sponsorship for this study.

Conclusion

The complexity of the hernias, socio-cultural factors and financial constraints were the key factors that influenced acceptability of mesh implantation in this study. The outcomes measures were comparable in both groups except the recurrence rates of 3.2% in suture-repair group versus 0.0% in the mesh group. Establishment of National Hernia Aids programs and introduction of Nigerian Hernia Society for surgeons with special interest in abdominal hernias are crucial steps that can upscale application of prosthetic implants to repair hernias.

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