

Elective repair of uncomplicated inguinal hernia in south eastern nigerian

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ABSTRACT

Aims and Objectives: Inguinal hernia repair is the most common operation in general surgery worldwide. Elective repair to safeguard complications is recommended because outcomes of early repair are uniformly superior to results of emergency operations. This study aimed to document our own experiences with regards to elective repair of uncomplicated inguinal hernia and compare our findings with previous data. **Materials and Methods:** This is a descriptive prospective study of 261 consecutive patients with uncomplicated inguinal hernias repaired electively at Federal Teaching Hospital, Abakaliki, southeastern Nigeria between January 2010 to December 2012. Relevant data extracted and analyzed with SPSS version 22.0 included patients' demographics, clinical details, surgical repairs and outcome measures. **Result:** A total of two hundred and sixty one patients with 306 uncomplicated inguinal hernias repaired electively were enrolled. The age range of the patients was 2 months – 88 years with a mean age of 35.7 +/- SD 16.6. Majority (46.4%) of the patients presented with hernias on the right side, the rest either had hernias on the left(36.4%) or both sides (17.2%). At operation, 203 (66.3%) hernias were indirect, 96 (31.4%) direct and 7 (2.3%) pantaloon hernias. Modified Bassini repair was used in the majority (66.7%) of patients. Complications occurred in only 9.7% of repairs. At a median follow up of 8 months, 1 (0.3%) hernia recurrence was seen. No mortality was recorded. **Conclusion:** Inguinal hernias in our environment are very common, but often neglected. Our results show that elective repair is critical for preventing devastating complications and ensuring successful surgical outcomes.

Key words: Hernia, Inguinal, Elective, Repair, Southeast Nigeria

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INTRODUCTION

Surgical conditions represent an immense yet under-recognized source of disease burden globally.¹ The study of such burden constitute a priority research agenda in global surgery.¹

Across the globe, inguinal hernia is the commonest hernia, accounting for about 75% of all abdominal wall hernias.¹⁻⁴ Repair of inguinal hernia is the most common operation in general surgery worldwide.^{2,5-7} It is estimated that more than 20 million inguinal hernias are repaired annually around the world; specific rates by country vary from 100 to 300 per

100,000 population per year.^{8,9} Due to poor documentation, the hernia surgery output is largely unknown in Africa, a continent with the greatest burden of the disease compared to the rest of the world.^{8,10,11} Nevertheless, it has been cited that in Africa, an estimated incidence rate of inguinal hernia is 175/100,000 persons each year, but that only 25 are actually repaired.^{8,10}

A recent epidemiological study in Ghana shows that at the current repair rate of 30 per 100,000 per year and incidence of symptomatic hernia of 210 per 100,000 per year, a backlog of one million hernias will develop over the next 10 years.¹ These observations in Ghana probably reflect

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the state of the art in most parts of Africa, where much higher percentages of indirect and inguinoscrotal types, emergency cases, morbidities and mortalities following surgery for inguinal hernias have been reported.^{2,3,8,12-14}

It has been reported that as high as 20-77% of inguinal hernia surgery output in Africa present as emergencies compared to 1-3% seen in Europe and America.^{2,3,9,12,14-17} In Kampala, Uganda,¹⁴ analysis of 208 groin hernias showed that 195 (93.7%) were inguinal hernias and 81.5% of these inguinal hernias were of indirect type. Further analysis showed that 54.5% of the inguinal hernias were strangulated at the time of presentation while significant complications occurred in 41.8% after repair.¹⁴ Mba,² in northwestern Nigeria, examined 227 consecutive patients with inguinal hernia and found that 20.6% presented as surgical emergencies while 20% of patients with complicated hernias died with or without surgery.

In our setting, inguinal hernias constitute a major workload for general surgeons, but the need for preventive surgical care is obviously ignored resulting in large accumulated pools of untreated inguinal hernias that have been neglected. Regrettably, it has been cited that numerous deaths occur almost daily in remote rural communities across Africa due to lack of adequate surgical care particularly in patients with long standing untreated hernias complicated with intestinal obstruction and strangulation.⁸ Many previously published studies have recommended prophylactic repair as a safeguard against sequels of late presentations in Africa with added benefits of cost containment and better postoperative outcome measures,^{2-4,8,10,11} yet published data on elective repair of inguinal hernias are scanty in our environment. The aim of this study is to document our own experience with regards to the clinical profile and highlight the surgical treatment and outcome measures of uncomplicated inguinal hernias repaired electively in Abakaliki and compare our results with previous studies.

PATIENTS AND METHODS

Design and setting

This is a descriptive prospective study of patients with uncomplicated inguinal hernias repaired electively in Federal Teaching Hospital, Abakaliki between January 2010 and December 2012. Federal Teaching Hospital, Abakaliki is located in the southeast geopolitical zone of Nigeria. It is a tertiary, teaching health institution that provides health services for Ebonyi and four other neighboring states in Nigeria.

Subjects

All consecutive 261 patients who presented with uncomplicated inguinal hernias and subsequently underwent

elective hernia repairs were included in this study. Patients who refused to give consent were excluded from the study. Those with strangulated or obstructed hernias were noted, but excluded from further analysis. Recruitment of patients to participate in the study commenced with records of socio-demographic data of each patient in a standard proforma after an informed consent was obtained. The clinical diagnosis of uncomplicated inguinal hernia was made after comprehensive clinical assessment by either a senior registrar or a consultant general surgeon. Also included in the proforma are duration before presentation, type, extent and number of hernia, side affected, primary or recurrence and reducibility of the hernia. Clinical diagnosis, associated problems (hydroceles), types of procedure and anesthesia, early postoperative complications, length of hospital stay and follow up outcomes were recorded.

Basic investigations like hemoglobin level and urinalysis were routinely ordered while focused laboratory tests were reserved for those with co-morbidities. Patients without comorbidities were admitted in the surgical wards on the morning of surgery. Patients with systemic diseases like hypertension, diabetes mellitus and elderly patients were admitted a day before surgery. Preoperative anesthetic review was done, adult patients advised nil per oral regimen and intravenous fluid containing glucose commenced on the morning of surgery. Diabetic and hypertensive patients were managed according to the standard protocols.

All hernia repairs in the pediatric age group were done under general anesthesia. Repairs in the adult patients were performed under general, spinal and local anesthesia depending on patients' physiologic state, extent of disease, surgeons' preference or anesthetist decision. Transverse skin crease incision was routinely adopted. Prophylactic antibiotics were used in the majority of cases. Following exposure and complete separation of the hernia sac, all the pediatric hernias were surgically treated by simple herniotomy. Adult patients received Modified Bassini, nylon darn and mesh repair in that order of frequency. Hydrocelectomy, mostly Lord's procedure was added to repairs in adult hernias with associated hydroceles. The posterior wall repair was routinely performed using nylon-2. Skin closure was executed by the subcuticular or simple interrupted method using nylon 2/0, or vicryl 2/0. Operative findings were noted and postoperative guidelines were clearly written out.

Daycare patients were discharged home on same day if deemed fit to go home safely. Short postoperative clinic visits were arranged for the daycare patients in addition to establishment of functional communication network like telephone contact. Postoperative course and findings were routinely recorded for both daycare and inpatient cases.

Inpatients were discharged after a variable period of 1-8 postoperative days. Available patients were followed up periodically for two years.

Statistical data analysis

Data was initially entered on a special feasibility form. Subsequently, statistical data analysis was done using Statistical Package for Social Sciences (SPSS) software version 22.0 (IBM, USA 2015). Categorical variables are reported as percentages. Mean, median and standard deviation were used to summarize continuous variables. Chi-square test was used to determine the p-values for categorical variables, with a p-value of less than 0.05 considered to constitute a statistically significant difference.

Ethical consideration

Ethical approval to conduct the study was obtained from the Teaching hospital's "Research and Ethical Committee" before commencement of the study.

RESULTS

During the 3 year period under study, 454 (16.3%) out of a total of 2,788 general surgical patients seen in the clinics and emergency units of the hospital had external abdominal wall hernias. Of the hernia group, 355 (78.2%) patients harbored inguinal hernias, representing 12.7% of the entire general surgery output during the study period. Among the patients with inguinal hernias, 261 (73.5%) had elective repair while the rest either defaulted from treatment after initial diagnosis(29,8.2%), had emergency repair (62,17.5%) or died before surgical repair (3,0.8%). The patients whose hernias were repaired electively formed our study cohorts.

Further analysis of the 261 patients showed an age range of 2 months to 88 years with a mean of 35.7 +/- SD 16.6. There were 211 males (80.8%) and 50 (19.2%) females with a male to female ratio of 4:1 (p<0.05).The peak age incidence was at 21-30 years age range after which the frequency progressively decreased (Figure 1).

The greater majority (98, 37.5%) of the patients were farmers, followed by the group comprising of under-five years and primary school pupils, 18.8% (49 patients). Unskilled laborers accounted for 16.5% (43 patients). The duration of symptoms prior to presentation ranged from 2 weeks to 29 years with a mean of 6.8 +/- SD 7.3. Though nearly half (46.7%,122) of the patients presented within 5 years of noticing the symptoms, only 20.3% (53 patients) did so within the first one year. Only 3.8% (10 patients) presented within one month of onset of symptoms while an impressive 50.2% (131 patients) waited between 6 to 20 years before presentation.

Fifty three(20.3%) out of a total of 261 patients were in the pediatric age group, 42 (79.2%) males and 11 (20.8%) females while 208 patients were adults, 169 (81.3%) males and 39 (18.7%) females. Majority (46.4%, 121) of the patients presented with hernias on the right side, another 95 (36.4%) individuals presented with left-sided hernias, the remaining 45 (17.2%) patient harbored bilateral hernias. The total number of hernias, laterality, nature, extent and type of hernias are presented in Table 1. Twenty (80%) out of 25 patients with associated hydroceles were male children, the remaining 5 (20%) were adult males.

Nearly two third (170, 65.1%) of the patients had their hernias repaired by trainee surgeons (senior registrars), the remaining 91 (34.9%) patients had their repairs fixed by the consultant surgeons. All the mesh hernioplasties were performed by consultant general surgeons. The associated hydroceles in children were all repaired by herniotomies while the adult cases necessitated hydrocelectomies in addition to modified Bassini repairs done. The methods

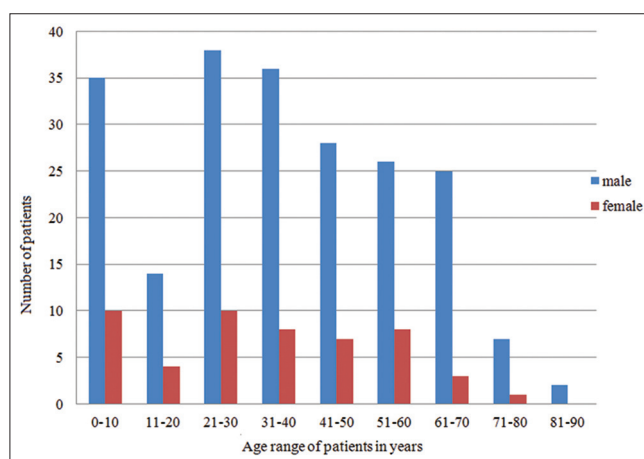


Figure 1: Age and sex distribution of patients with uncomplicated inguinal hernia

Operative/ clinical findings	Unilateral Hernia		Bilateral Hernia		Total (percentage)
	Right	Left	Right	Left	
Nature					
Direct	37	28	17	14	96 (31.4)
Indirect	80	65	28	30	203 (66.3)
Pantaloon	4	2	0	1	7 (2.3)
Total	121	95	45	45	306 (100.0)
Extent					
Complete	51	32	18	13	114 (37.3)
Incomplete	70	63	27	32	192 (62.7)
Total	121	95	45	45	306 (100.0)
Type					
Primary	107	89	40	42	278 (90.8)
Recurrence	14	6	5	3	28 (9.2)
Total	121	95	45	45	306 (100.0)

of repair and types of anesthetic techniques employed are shown in Table 2.

The vast majority of the patients (74.3% 194) had their anesthesia conducted by anesthetic resident doctors and nurses; the remaining 67 (25.7%) cases were done by consultant anesthetists.

The outcome measures recorded in this study are length of hospital stay, short term and long term complications. The duration of hospital stay ranged between 0 to 8 days with a median of 6 days. Among 10 patients managed on daycare basis, 5 (50%) had repair under local anesthesia, 3 (30%) under spinal anesthesia and another 2 (20%) under general anesthesia. Furthermore, 10 (3.8%), 33 (12.6%) and 138 (52.9%) patients were admitted for 1-2, 3-4 and 5-6 days respectively. The remaining 70 patients stayed 7-8 days before discharge from hospital. The complications noticed during hospitalization and at the time of surgery were few and minimal, except one case of bladder laceration in adult male with unilateral right inguinoscrotal hernia. This hernia had a sliding component with bladder wall forming part of the hernia sac. The injury was identified intra-operatively and repaired primarily. The postoperative complications recorded after repair of the 306 hernias are shown in Table 3 below.

All the wound infections were superficial; no systemic sepsis was recorded. There was no statistically significant difference between the type of repair technique and wound infection rate ($p > 0.05$), but wound infections were commoner in inguinoscrotal (complete) than inguinal (incomplete) types ($p < 0.05$). Higher rates of infections

were also recorded in repairs done by trainee surgeons than wounds of hernias repaired by consultant surgeons. All other short term complications other than the bladder injury were managed conservatively. On long term basis, all five patients with chronic pain improved satisfactorily with analgesics and counseling. Among the follow up patients, only one adult male patient whose bilateral inguinoscrotal hernia was repaired by a trainee surgeon using modified Bassini technique developed recurrence on the right side.

Out of the 261 operated patients, 196 (75.1%), 156 (59.4%), 108 (41.4%) and 32 (12.3%) patients were available for follow up at 1 month, 3 months, 6 months and one year respectively. The duration of follow up ranged from 1 to 24 months with a median of 8 months. There was no mortality recorded in this study.

DISCUSSION

Worldwide, inguinal hernias are very common, particularly in Africa, but the burden of the disease in the continent remains insufficiently described mostly related to negligence engendered by poverty and ignorance.^{1-3,8} In a recent population based survey in Ghana, the concept of 'Disability Adjusted Life – Years'(DALY) was used to estimate the economic burden needed to treat these hernias.¹ The researchers estimated that potentially five million DALY would be averted by increasing rate of elective hernia repairs in Ghana alone.¹ In Africa specifically, it has been proven that elective inguinal hernia repair can be performed cheaply with a DALY costing 12.88 US dollars.¹⁰ This cost is comparable or more affordable than other disease control strategies already existing in many low and medium income countries (LMICs).¹⁸ These strategies include insecticide-treated bed nets, oral rehydration salts or antiretroviral therapy, hence the need for consideration of inguinal hernia a functional component of public health system.¹⁸

The 78.2% rate of inguinal hernia documented in this study is in common agreement with data in many previously published studies.²⁻⁷ In Egypt however, a lower frequency of 56% was reported due to higher relative frequencies of adult umbilical (22.7%) and epigastric (7.4%) hernias in upper Egypt.¹⁹ The reasons adduced include high prevalence of chronic liver disease, early marriage and multiple pregnancies common in Egypt.¹⁹

Generally, inguinal hernia accounts for 10-15% of operations in general surgery.^{6,7} In our brief general surgical audit, inguinal hernia constitutes 12.7% of all surgical conditions seen by the general surgeons during the study period making it the most frequently performed operation

Table 2: Relation of surgical methods to the anesthetic techniques

Procedure	GA	Spinal	LA	Total (%)
Modified bassini	127	36	6	169 (64.8)
Darning	25	3	2	30 (11.5)
Herniotomy only	53	0	0	53 (20.3)
Mesh repair	1	3	0	4 (1.5)
Modified bassini and hydrocelectomy	2	3	0	5 (1.9)
Total (%)	208 (79.7)	45 (17.2)	8 (3.1)	261 (100.00)

Table 3: Postoperative complications after elective repair of uncomplicated inguinal hernias

Complication	Frequency	Percentage
Wound infection (superficial)	12	3.9
Scrotal hematoma	6	2.0
Seroma	3	1.0
Bladder laceration	1	0.3
Urinary retention	2	0.6
Chronic pain	5	1.6
Recurrence	1	0.3
Total	30	9.7

in our unit. Our finding is consistent with the rate of 12.5% reported in Zaria,²⁰ Nigeria and 13.3% in Tanzania.³ A more disturbing figure of 65% was reported after an audit of the surgical outputs of 8 hospitals in Uganda, Tanzania and Mozambique, prompting the investigators to conclude that there is a great unmet need for surgery in Africa.¹⁰

In the current report, inguinal hernias showed predilection for male sex and right side, starts early in life and are predominantly indirect and inguinoscrotal. These findings are consistent with reports from previously published data.^{2-4,6,7,8,20,21} Together with a significant bilateral rate of 17.2%, the above pattern supports the congenital basis of some of these hernias that either present early in life commonly as inguinoscrotal or inguinolabial hernias or smolder into late childhood and adult stages before becoming clinically discernible. Elsewhere, it has been cited that the later descent of the right testis into the scrotum in the peri-natal period leaving the processus vaginalis open is the most rational explanation for the right sided preponderance.^{2,3} Four interesting cases of right sided inguinal hernias were observed in the index study; three had previous appendectomies while one individual reported trauma to the right lower abdomen two years previously. These observations highlight the influence of neuromuscular damaging incisions and injuries in the etiology of inguinal hernias previously reported by other workers.² Another peculiarity of inguinal hernia in our setting is the finding that 53.3% of our study cohorts presented more than 5 years after onset of hernia, similar to a figure of 44.7% reported in Tanzania.³ Our observations that inguinal hernias occur more frequently in farming rural dwellers and other persons with limited resources and health awareness are compounded by distance and poor accessibility to healthcare with subsequent late or emergency presentations in our environment.

In the current study, all the hernia repairs were done by the open method. The modified Bassini repair was used in nearly two-thirds (66.3%) of all cases, in agreement with rates of 65.3-79.0% reported by previous authors.^{2,3,14,21} In the current era of tension free repair in the developed world, modified Bassini method no longer satisfies the requirements of satisfactory hernia surgery, but still remains the standard in Africa.^{7,10,11,14} In a general hospital in Ibadan, Nigeria, Irabor²¹ repaired all the adult inguinal hernias by modified Bassini technique, a further testimony of the popularity of the technique in Africa. Surgeons preference, simplicity, affordability, ease of execution and persistent underfunding of health systems are the reasons for the popularity of Bassini method in Africa.^{2,3,8,10,11} Nevertheless, the time-honored Bassini technique and its various modifications will most likely continue to be relevant in Africa where repairs involving strangulated

hernias are common until biologic meshes become available and affordable in Africa. Only 4(1.5%) patients received mesh repair in this study, higher than the 0.2% in Tanzania³ and 0% in many other African studies.^{2,4,14} Operation hernia, a European-led hernia aid in Africa, recently reported on a large surgical output of 1748 daycare patients from 8 centers in Nigeria, Ghana and Ivory coast whose inguinal hernias were repaired electively with mesh.¹⁰ The authors concluded that daycare inguinal hernia repair with mesh is safe in Africa provided the level of sterility during the procedure is high and the surgeon has adequate experience. They further recommended routine use of mesh in elective inguinal hernia repair in Africa.¹⁰

Surgical site infection with a rate of 3.9% seen in the index study is the most common complication encountered. This figure is lower than values of 4.5-6.7% reported previously in similar studies^{3,7,14,22} evaluating complicated and uncomplicated inguinal hernias simultaneously. Interestingly, all the wound infections were superficial and together with other short term outcomes, resolved spontaneously on conservative measures. Only a single major complication involving the urinary bladder was recorded, but recognized intra-operatively and repaired primarily, a condition that probably would have been missed under emergency setting. There is no mortality reported in this study in agreement with previous studies^{23,24} involving uncomplicated inguinal hernias repaired electively. Many studies involving complicated inguinal hernias in Africans have quoted mortality rates of 0.5-40%.^{2,3,7,8}

Despite the limitations imposed by short follow up, the recurrence rate seen in this study is low compared to rates of 1-10% cited previously.^{2,22} A recent study in Turkey²⁵ shows that chronic pain occurs in up to 15.4-17.6% of patients after inguinal hernia repair. The low rate of chronic pain reported in our study could be due to short follow up or under-reporting of symptoms by patients, though similar low rates ranging from 2.9-4.8% have been reported by other African workers.^{2,3,22}

CONCLUSION

Inguinal hernias are common surgical conditions in our environment. Though the evolution of tension-free repair in our setting is slow, unfavorable features like bilateral, indirect, sliding inguinoscrotal hernias are important predictors of morbidity after elective inguinal hernia repair.

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Authors Contribution:

OAU – conceptualized the study and performed the literature search, coordinated the manuscript writing, data collection and analysis. He participated in manuscript editing and did the submission; **ESO** – participated in data analysis, manuscript writing and editing. Both authors read and approved the manuscript for submission.

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