Original Article

Bilateral Inguinal Hernia: Epidemiology and Outcomes of Surgical Treatment in Southeast Nigeria

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Abstract

Background: In the past, bilateral inguinal hernias were repaired sequentially to avoid tension in the suture line which was thought to be responsible for high recurrences, but the use of prosthetic meshes to repair the hernia simultaneously has become the standard practice. The purpose of this study is to document the incidence and repair outcomes of bilateral inguinal hernias in our environment. **Patients and Methods:** This was a 10-year retrospective study of patients who had surgical repair of bilateral inguinal hernia. **Results:** A total of 308 patients with bilateral inguinal hernias were evaluated, representing 16.6% of all patients with inguinal hernias during the period of study. There were 302 males and six females. Nearly one-quarter (23.4%) presented emergently, but none had complications in both groins. The risk factors for the disease were many. Precisely, 299 (97.1%), 248 (80.5%), 212 (68.8%), 59 ((19.2%), and 36 (11.7%) patients were males, 46 years and above, engaged in regular strenuous activities, had raised intra-abdominal pressure and had a positive family history of bilateral hernias, respectively. Approximately three-quarter (75.3%) were direct, 15.6% indirect, and 9.1% were both direct and indirect. Mesh repair was used in 36.4% of the elective repairs, while the remaining 150 elective cases were repaired using either Modified-Bassini (76, 32.2%) or nylon darn (74, 31.4%) method. Overall, morbidity, mortality, and recurrence rates were 23.1%, 1.6%, and 1.9%, respectively. Morbidity was mainly due to wound infections (10.1%), seroma (3.9%), chronic groin pain (2.0%), bowel injury (1.3%), and others (3.9%). Four deaths occurred in patients with bowel resections complicated with sepsis, enterocutaneous fistula, and abdominal compartment syndrome (one, one, and two patients, respectively). The fifth death was from sepsis in an elderly patient who had laparotomy without intestinal resection. **Conclusion:** The use of mesh for simultaneous repair of elective bilateral inguinal hernia is associated with lower rates of recurrence and comparable rates of wound infections and seroma compared to suture-based repairs. Simultaneous bilateral repair with mesh implants is therefore feasible, safe, and effective in our environment.

Keywords: Bilateral hernia, inguinal, mesh, repair, simultaneous

Introduction

An inguinal hernia is the most common abdominal wall hernia, and its repair represents 10%–15% of all general surgical procedures.[1,2] Reports on rates of bilateral inguinal hernias in adults, especially in males, are highly variable. In the USA, it ranges from 5% in an epidemiological survey to 22% in the revision of open inguinal hernia repairs to values as high as 32.2%–64% in laparoscopic inguinal hernia repairs.[3]

The frequency of bilateral inguinal hernias is not known due to different yardsticks for the discovery of these hernias by clinical examination, palpation to detect hernia in the contralateral side during open hernia repair, or detection during laparoscopic procedures.[3] Moreover, the definition of bilateral inguinal hernias encompasses situations such as "previously repaired hernia in a contralateral side," "bilateral hernia had been detected as such by the patient prior to assessment," or hernia was detected in the course of index hospital admission.[3,4]

In the past, bilateral hernias were repaired sequentially to avoid tension in the suture line, which at that time was thought to be responsible for high recurrence.[3,5] However, over time,

Access this article online

Quick Response Code:

Website: www.njmonline.org

DOI: 10.4103/NJM.NJM_28_20

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How to cite this article: Ogbuanya AU, Dilibe U. Bilateral inguinal hernia: Epidemiology and outcomes of surgical treatment in Southeast Nigeria. Niger J Med 2020;29:401-6.

Submitted: 11-Apr-2020 **Revised:** 27-Apr-2020
Accepted: 08-Jul-2020 **Published:** 18-Sep-2020

this practice was modified and many authors confirmed the advantages of simultaneous repair of bilateral inguinal hernias.[3,5] In the era of sequential repair, posterior wall reinforcement in the Bassini or Shouldice fashion was responsible for high treatment failures, hence the need for a new surgical approach.[3-5]

The tension-free method, either open or laparoscopically, became a useful modification that enabled authors to enthusiastically accept the shift from sequential to simultaneous bilateral repair, utilizing mesh implants for posterior wall strengthening.[3,4,6]

Curiously, organized studies and clinical data on bilateral inguinal hernias in our locality are scanty and poorly documented, mainly as appendages while discussing various subjects of inguinal hernias. The aim of this study is to document the incidence and outcomes of the treatment of bilateral inguinal hernia in our environment.

Patients and Methods

Design and setting

This was a 10-year descriptive retrospective study of patients surgically managed for bilateral inguinal hernias from January 2008 to December 2017. All the patients were managed at Alex Ekwueme Federal University Teaching Hospital Abakaliki (AEFUTHA), Ebonyi State, and at the adjourning mission hospitals at Afikpo (Mater Misericordiae Hospital [MMH]), Ebonyi State, and Nsukka (Bishop Shanahan Hospital [BSH]), Enugu State, all in Southeast Nigeria.

Subject/procedure

The case files of all (308) the patients who had repairs for bilateral inguinal hernias in the three hospitals during the period under review were retrieved from the medical record departments of the hospitals. Details of their sociodemographic characteristics, duration of hernia, mode of presentation, hernia type (bubonocele, funicular, and inguinoscrotal), presence of comorbidities, method of repair (suture-based or mesh implant), anesthetic techniques, and treatment outcomes were noted and recorded. The duration of follow-up, as noted in the case files ranged from 2 weeks to 24 months. Initially, the patients were given two weekly appointments for 1 month, then three monthly for 1 year, and thereafter, every 6 months. All postoperative complications recorded in the case files were noted.

Data analysis

Data analysis was done using the Statistical Package for Social Sciences (SPSS) software version 22.0 (IBM, Chicago, IL, USA, 2015). Data were presented as mean, standard deviation (SD), percentages, and tables. Confidence interval was calculated at 95% level and significance at 5% probability level ($P < 0.05$).

Ethical approval

The protocol for this study was approved by the research and ethics committee of AEFUTHA, BSH, and MMH before the commencement of the study.

Results

A total of 308 bilateral inguinal hernias were repaired, representing 16.6% of 1854 inguinal hernias treated surgically during the 10-year period of the study. The ages of the patients ranged from 16 to 86 years, with a mean of 56.21 ± SD 15.26. There were 302 males and six females, giving a male-to-female ratio of 50:1. Many (59, 19.2%) patients with bilateral hernias also have associated raised intra-abdominal pressure from urinary obstruction, ascites, obesity, and chronic respiratory diseases. The relative frequencies of various risk factors among patients with bilateral inguinal hernias in this series are shown in Table 1.

A majority (236, 76.6%) of the patients presented after 2 years of noticing the hernias. Less than a tenth (28, 9.1%) presented within 1 year, while as many as 112 (36.4%) patients waited till after 5 years of onset of the hernias before presentation. Sixteen (5.2%) patients said either or both of the hernias had existed for 25 years or more before presentation.

The annual repair rates and methods of repair are shown in Table 2. The rates of emergency and elective repairs decreased over the following years, while the mesh acceptance rate and mesh implantation rates increased steadily [Table 2]. All the patients with elective cases were counseled for mesh repair. In 2008, none (0.0%) of the 24 patients counseled for mesh eventually received mesh implantation. However, in 2009, 2010, and 2011, only one each of the corresponding 17, 19, and 21 patients who were counseled for mesh received it ultimately. However, in the last year (2017), 28 (82.4%) of the 34 elective cases counseled for mesh received it [Table 2]. All the mesh repairs were performed by consultant general surgeons. Of the 72 (23.4%) patients who presented emergently, none had complications on both the groins simultaneously. All mesh implantations and 218 (98.2) of the 222 suture-based repairs were simultaneously performed. Information regarding simultaneous repair was not available in four patients repaired emergently. None of the repairs was performed laparoscopically, probably due to the fact that expertise and facilities for laparoendoscopic hernia repair were scarcely available in the study centers. Nearly one-fifth (14, 19.4%) of those with emergency presentation had hernia incarceration with pain, 28 (38.9%) were obstructed at the time of presentation, while the remaining 30 (41.7%) patients had strangulated inguinal hernias (SIH). Sixteen of the 30 patients with SIH had bowel resections giving a resection rate of 5.2% for bilateral inguinal hernia and 22.2% for complicated bilateral inguinal hernia.

More than one-third (119, 38.6%) of the patients had comorbid illnesses, but some have two or more comorbidities giving rise to a total of 182 associated medical diseases. Eleven of the 39 patients with systemic hypertension had other comorbidities; similarly, 14 of the 34 patients with benign prostatic hyperplasia (BPH) harbored other comorbid conditions [Table 3]. Prior to elective operative repair, patients with BPH were referred to the urology

Table 1: Risk factors for the development of bilateral inguinal hernias

Risk factors (age specific)	Age range (years), number of patients (%)			Total (%)
	16–45	46–65	>65	
Type of hernia				
Direct	27 (8.7)	136 (44.2)	69 (22.4)	232 (75.3)
Indirect	22 (7.1)	16 (5.2)	10 (3.2)	48 (15.6)
Direct + indirect	11 (3.6)	10 (3.2)	7 (2.3)	28 (9.1)
Gender				
Male	60 (19.5)	160 (51.9)	82 (26.6)	302 (98.1)
Female	1 (0.3)	1 (0.3)	4 (1.3)	6 (1.9)
Raised IAP				
Yes	3 (1.0)	21 (6.8)	35 (11.4)	59 (19.2)
No	57 (18.5)	141 (45.8)	51 (16.6)	249 (80.8)
Recurrent CIH				
Yes	5 (1.6)	34 (11.0)	30 (9.7)	69 (22.4)
No	55 (17.9)	128 (41.6)	56 (18.2)	239 (77.6)
Family hx of IH				
Present	21 (6.8)	11 (3.6)	4 (1.3)	36 (11.7)
Not present	39 (12.7)	151 (49.0)	82 (26.6)	272 (88.3)
Occupation				
Farmers	11 (3.6)	81 (26.3)	46 (14.9)	138 (44.8)
Artisans	35 (11.4)	22 (7.1)	17 (5.5)	74 (24.0)
Others	14 (4.5)	59 (19.2)	23 (7.5)	96 (31.2)

IAP: Intra-abdominal pressure, hx: History, IH: Inguinal hernia, CIH: Contralateral inguinal hernia

Table 2: Annual incidence and repair methods

Year	Elective cases			Emergency cases	Total (%)
	Nylon Darn	Modified-Bassini	Mesh	Modified-Bassini	
2008	6	18	0	12	36 (11.7)
2009	4	12	1	13	30 (9.7)
2010	5	13	1	10	29 (9.4)
2011	8	12	1	8	29 (9.4)
2012	5	13	0	8	26 (8.4)
2013	10	6	5	6	27 (8.8)
2014	13	1	10	5	29 (9.4)
2015	9	1	18	3	31 (10.1)
2016	8	0	22	3	33 (10.7)
2017	6	0	28	4	38 (12.3)
Total (%)	74 (24.0)	76 (24.7)	86 (27.9)	72 (23.4)	308 (100.0)

clinic for urological evaluation, some were commenced on medical treatment of BPH, while others were scheduled for prostatectomy before hernia repair. Those with chronic respiratory illness who presented electively were similarly referred to the medical outpatient clinic for optimization before hernia repair. Routinely, deep-vein thrombosis prophylaxis was commenced for those at risk. The postoperative complications and length of hospital stay are shown in Table 4. Six (1.9%) patients developed abdominal compartment syndrome (ACS) and two of them died from respiratory failure . The surviving four patients were promptly managed in the intensive care unit and supported with positive pressure ventilation.

Pfannenstiel incision was used in 198 (83.9) of the 236 patients who had elective repair; of the 38 that received bilateral groin incision, none had more than one postoperative wound event on both sides. The six (1.9%) recurrences were on patients treated electively by non-mesh repair or those repaired emergently. All the recurrences were unilateral. In the elective non-mesh repair arm, identified factors for recurrences were postoperative wound infections, obesity, and none use of mesh implants in all three patients. Similarly, on the emergency arm, hernia recurrences were contributed by wound infections, none use of mesh for repair, persistent cough in the perioperative period, and raised intra-abdominal pressure from symptomatic BPH. In the course of the follow-up, four of the six identified recurrences were fixed with mesh implants. Majority (19,

Table 3: Comorbid medical diseases

Comorbidities (age specific)	Age range (years), frequency (%)			Total	Total (%)
	16-45	46-65	>65		
Hypertension	2 (3.3)	15 (9.3)	22 (25.6)	39 (*11)	12.7
Diabetes	1 (1.7)	2 (1.2)	4 (4.7)	7 (*5)	2.3
BPH	0 (0.0)	18 (11.1)	16 (18.6)	34 (*14)	11.0
Urethral stricture	1 (1.7)	3 (1.9)	2 (2.3)	6 (*3)	1.9
COPD	0 (0.0)	5 (3.0)	7 (8.1)	12 (*3)	3.9
Obesity	2 (3.3)	5 (1.9)	2 (2.3)	9 (*8)	2.9
Chronic renal disease	0 (0.0)	1 (0.6)	3 (3.4)	4 (*4)	1.3
Chronic liver disease	0 (0.0)	0 (0.0)	1 (1.2)	1 (*1)	0.3
Cardiomyopathy	0 (0.0)	1 (0.6)	1 (1.2)	2 (*2)	0.6
Tuberculosis	1 (1.7)	1 (0.6)	0 (0.0)	2	0.6
Sickle cell disease	1 (1.7)	0 (0.0)	0 (0.0)	1	0.3
HIV/AIDS	2 (3.3)	0 (0.0)	0 (0.0)	2 (*1)	0.6
Total	10 (16.7)	51 (31.5)	58 (67.4)	119 (182)	38.6

*Some patients had two or more comorbidities. †BPH: Benign Prostatic hyperplasia, ‡COPD: Chronic obstructive pulmonary disease, ¥HIV/AIDS: Human immunodeficiency syndrome/acquired immunodeficiency syndrome

Table 4: Post-operative outcomes

Outcomes	Elective		Emergency	Total (%)
	Mesh (%)	Suture repair (%)	Anatomic (%)	
Postoperative morbidity (%)				
Wound infection	5 (5.8)	8 (5.3)	18 (25.0)	31 (10.1)
Seroma	4 (4.7)	5 (3.3)	3 (4.2)	12 (3.9)
Hematoma	1 (1.2)	4 (2.7)	4 (5.6)	9 (2.9)
Bladder laceration	1 (1.2)	0 (0.0)	2 (2.8)	3 (1.0)
Chronic groin pain	1 (1.2)	2 (1.3)	3 (4.2)	6 (2.0)
Bowel injury	0 (0.0)	1 (0.7)	3 (4.2)	4 (1.3)
Enterocutaneous Fistula	0 (0.0)	0 (0.0)	2 (2.8)	2 (0.6)
Sepsis	0 (0.0)	0 (0.0)	4 (5.6)	4 (1.3)
ACS	1 (1.2)	2 (1.3)	3 (4.2)	6 (2.0)
Recurrence	0 (0.0)	3 (2.0)	3 (4.2)	6 (2.0)
Total	13 (15.1)	25 (16.7)	45 (62.5)	83 (26.9)
Length of hospital stay (days)				
Day case	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
1-3	58 (18.8)	126 (40.9)	20 (6.5)	204 (66.2)
4-7	26 (8.4)	18 (5.8)	24 (7.8)	68 (22.1)
>7	2 (0.6)	6 (1.9)	28 (9.1)	36 (11.7)
Postoperative mortality (%)	0 (0.0)	0 (0.0)	5 (6.9)	5 (1.6)

ACS: Abdominal compartment syndrome

76.0%) of the 25 postoperative complications in the elective non-mesh repairs were recorded in cases performed by a trainee and general duty doctors. They included six wound infections, four seromas, four recurrences, three hematomas, one bowel laceration, and one chronic groin pain.

The mortality rate was 1.6% (five deaths): four occurred on those with resection and one on an elderly patient who was strangulated and developed sepsis postoperatively. Precisely, the four bowel resections were complicated with sepsis, enterocutaneous fistula, and ACS as recorded for one, one, and two patients, respectively. The fifth death was due to sepsis after laparotomy in the elderly patient.

Discussion

Existing published data on the surgical output and Clinico-epidemiologic profile of bilateral inguinal hernia in our environment no longer satisfy the requirements needed to build a robust clinical database on this subject, mostly due to the fact that discussions on bilateral hernias were merely sandwiched in topics such as inguinal hernia, abdominal wall hernia, and groin hernia.[2,7,8] The current study offered ample opportunity to critically audit our practice with respect to a bilateral inguinal hernia, and we observed some striking peculiarities on the incidence, risk factors, prosthetic mesh utilization, and operative morbidity profile of bilateral inguinal hernias.

In this series, patients with bilateral hernia accounted for 16.6% of all patients with an inguinal hernia during the period under review, consistent with rates of 15.2% and 17.2% from Ibadan and Abakaliki, respectively, both in Nigeria, but <20.4% quoted at Bugando, Tanzania.[1,2,7] The explanation for the higher frequency of bilateral hernias in Tanzania may be related to the gap in the study design because patients aged 3 months to 78 years were included in Tanzania compared to age-adjusted cohorts (16 years and above), recruited in the Nigerian series.

The close association between direct inguinal hernia and acquired causes has been highlighted and is thought to be related to weakness in the posterior wall of the inguinal canal (aging, neuromuscular, and aponeurotic injuries) or increased intra-abdominal pressure (chronic cough, chronic urinary obstruction from urethral stricture or prostatic hypertrophy, chronic constipation, heavy manual work, and weight lifting).[1,2,7,9-11]

Curiously, the majority of the risk factors listed above were prominent in our study population. In a referral hospital in Egypt, Al-Shemy *et al*. reported on the effectiveness of the Lichtenstein method for primary bilateral inguinal hernia repair.[11] The authors found that the majority of the patients were farmers and that chronic obstructive pulmonary disease, benign prostatic hyperplasia (BPH), and smoking were present in 22.5%, 12.5%, and 37.5% of the patients, respectively.[11] In addition, 82.5% of the patients had direct bilateral hernias.[11]

Overall, the occurrence of multiple comorbidities in older patients synergistically increased the risk of bilateral hernias in this report akin to the findings by previous investigators[3,10-13] A major problem that can arise in patients with huge, bilateral inguinoscrotal hernia is when the contents of the hernia have been housed outside the intra-abdominal cavity for a long time, leading to loss of domain and resultant ACS during and after the operative repairs in the manner similar to experiences by previous authors that managed large hernias.[14-16]

Incidentally, six patients from this series developed features suggestive of ACS after surgery and needed respiratory support, but unfortunately, two died due to the unavailability of resident anesthetists to institute positive-pressure ventilation at the rural mission hospitals. Indeed, the use of mechanical ventilators to manage established cases of ACS has been reported by several workers.[14-16] In the perioperative period, serial pneumoperitoneum, use of graduated abdominal binders to generate external pressures and mesh implantation have been shown to significantly reduce the incidence of ACS.[14-16] These maneuvers have helped anesthetists and hernia surgeons to overcome the difficult challenge that may arise in the course of repairing huge hernias.[14-16]

The debate on the optimal approach and technique for repair of bilateral inguinal hernia has continued over the years until the era of tension-free repairs performed in the open Lichtenstein or laparoendoscopic fashion.[3,5,10-12] In the past, during the preprosthetic era, some researchers argued that repair of bilateral inguinal hernias should be sequential, citing significant tension in the suture line when bilateral hernias were repaired simultaneously as the key determinant of unusually high recurrences observed after anatomic, suture-based repair.[3,11,12,17] The benefit of simultaneous repair of bilateral hernia using tension-free method has been emphasized, and the advantages include performing both repairs under a single anesthetic period, avoiding the risk of strangulation or incarceration that can occur with sequential repair, reducing the stress of a second operation, and avoiding the cost of another surgical procedure.[3,12,17]

The annual repair rates for both elective and complicated hernias and the prosthetic mesh uptake rates during the 10 years under review, showed a marked decline in the rate of utilization of suture-based repair techniques as well as on the emergency presentation rates. Overall, all the cases evaluated in this survey were repaired simultaneously and this precluded the opportunity to compare the results of sequential and simultaneous repairs. Precisely during the time under review, urgent repair and modified Bassini repair rates decreased three- and fourfolds, respectively, while the prosthetic implantation rates smoldered over the first half of the study period then increased ten-folds at the 7th year before hitting thirty times the original rate in the 10th year (2017).

The decline in the proportion of emergency repairs over the years may be explained by an accompanying rise in the rates of elective repairs, which, in turn, is a response to an overall improvement in the national health delivery system and policies. In the past, it was commonplace to find adult males in Nigeria walking around with large untreated inguinal hernias, which extended to the knee, but the trend has changed due to numerous private hospitals and government-owned health institutions involved in the treatment of this condition even in the remote areas.[2,7,18] Interestingly, the impressive acceptance of prosthetic meshes by patients in this series may be partly explained by policy changes by the authors which included elaborate and consistent advocacy for mesh implantation through discussions with patients and their relatives.

The emergency presentation rate of 23.4% reported in this series is comparable to rates of 17.5%–29.7% noted in previous studies on inguinal hernias.[1,2,18] The negative impact of late presentation on the bowel resection rate and overall operative morbidity and mortality rates cannot be overlooked.[19] In this series, bowel resections were confined to patients with SIH and 86.7% (26) of patients with strangulation presented after 24 h from the onset of a complication. Indeed, a delayed presentation was the single most important prognostic indicator of poor outcome measures in this series comparable to observations made in Ibadan and Sokoto both in Nigeria, Tanzania and Ghana.[1,7,12,19]

The much lower percentage (1.9%) of females in this series compared to rates of 5.7%–19.2% in studies evaluating inguinal hernia generally is statistically significant ($P < 0.05$). In studies done in patients with

bilateral inguinal hernias in Egypt and India, a more disturbing rate of 0.0% was reported in both countries.[6,11] It has been emphasized that bilateral inguinal hernias in younger phenotypic females must be evaluated thoroughly to rule out a disorder of sexual development that may arise from congenital adrenal hyperplasia, androgen insensitivity syndrome, complete Leydig cell hypoplasia, or gonadal agenesis/dysgenesis.[20,21]

The postoperative morbidity profile observed in this report revealed higher rates of major events such as wound infection (10.1%), visceral injuries (2.3%), and recurrence (1.9%) compared to rates of 3.9% for wound infection, 0.3% for visceral injury, and 0.3% for recurrence reported in a previous similar study in our environment that examined unselected patients with inguinal hernias.[2] All the recurrences occurred in the cases repaired by the non-mesh method.

Many of the postoperative adverse events were recorded in elective repairs performed by general duty doctors at the mission hospitals and lower rank of trainee surgeons at the tertiary hospital. The explanation may be related to inexperience and poor adherence to aseptic principles during the surgical procedures akin to the observation made in Sokoto,[18] Nigeria.

Conclusion

Bilateral inguinal hernia constitutes a significant workload for the general surgeon in our environment. The morbidity and mortality rates after repair of these hernias are higher than rates obtained in studies that examined inguinal hernias generally. Simultaneous elective repair of bilateral inguinal hernia with prosthetic meshes is safe and effective.

Acknowledgment

We sincerely thank the head, department of surgery, Dr. Obasi Akputa (FWACS), for his kind cooperation during the study. We express our gratitude to the board of consultants, general surgery section of our institution for their understanding and cooperation throughout this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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