



Evaluation of External Abdominal Wall Hernia Surgery in a Secondary Level Facility in Kumasi, Ghana

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Authors' contributions:

This work was carried out in collaboration among all authors. Author SM designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors POMM and IK contributed to drafting of the manuscript and managed the literature searches. Authors GAA, MTM and GAR contributed to literature search and statistical analysis. Authors SD and GAR proofread and edited the entire manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Aims: We aimed at auditing hernia surgeries performed at a secondary care center and determine the outcome of surgery based on the grade of operating surgeon.

Study Design: A single center retrospective study.

Place and Duration of Study: Department of Surgery of Ashanti regional Hospital between October 2015 to September 2018.

Methodology: We included 259 patients, age ranging between 1 and 84 years, who underwent external hernia surgeries. Information retrieved included patient demographics, type of hernia, duration of hernia, whether hernia was emergency or elective, method of repair, whether surgery was performed by a surgeon or non-surgeon and early post-operative complications. Data was

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analyzed using PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc SPSS. Bivariate analysis was done to ascertain relationship between complications and operating doctor.

Results: A total of 259 hernia surgeries were performed over the study period. There were 186 (71.8 %) males and 73 (28.2 %) females, age range of 1 to 84 years. There were 66 (25.5%) children and 193(74.5%) adults. Children in their first decade were the majority (22.4%) age group followed by adults in their 5th decade (17%). Inguinal hernia was the most common (75.7%) type of hernia, 49 (18.9%) children and 147(56.6%) adults. There were 32 (12.4%) emergencies. Small bowel (20) was the most common content found in the hernia sac with 6 of them being gangrenous. Hematoma was the most common early complication. The majority (63.7%) of the cases were performed by the general surgeon and (20.1%) by house officers (interns) under supervision. Complications like haematoma, surgical site infection and acute urinary retention were more likely to occur in the non-surgeon operators. There was no statistically significant relation between the grade of operating surgeon and Haematoma ($p = 0.28$) and surgical site infection ($p = 0.76$).

Conclusion: Hernias are common in children in the first decade and in adults in the 5th decade. With a well-structured training programme non-surgeon physicians can be trained to perform hernia surgeries with relatively low complication.

Keywords: Hernia; non-surgeon; training; Ghana.

1. INTRODUCTION

Abdominal herniae are common among patients with surgical diseases. The most common type, inguinal hernia, constitutes 75-77% [1–3]. A recent study in Kumasi, Ghana, reported the prevalence of inguinal hernia in men as 13% [4].

In Ghana, inguinal hernia repair is the second most common surgery performed in district hospitals [5] Even though it is a common procedure performed in Ghana, the rate of hernia repair is considered low [4] Various reasons have been given to the relatively low rates of hernia repair . Amongst them are financial, low capacity in the area of human resource and infrastructural deficit. There have been numerous interventions to address this problem. These include training of non-surgeon doctors and outreach programs by national and international experts in hernia surgery. These interventions may have increased the repair rate [6,7]. Ashanti Regional Hospital, is a resource limited hospital where hernia surgeries are performed by a specialist general surgeon and non- surgeon doctors trained to perform hernia surgeries. This study is to audit hernia surgeries performed in the hospital over a 3- year period (2015-2018) and determine the outcome of surgery based on the grade of operating surgeon.

2. MATERIALS AND METHODS

A single center retrospective study was conducted from October 2015 to September 2018 at the Ashanti Regional Hospital in Kumasi.

All patients who underwent treatment for all types of external abdominal wall hernia in the hospital were included in the study.

Data obtained from patient records were recorded on structured data abstraction form. Information retrieved included patient demographics, type of hernia, duration of hernia, whether hernia was emergency or elective, method of repair, whether surgery was performed by a surgeon or non-surgeon and early post-operative complications. Completed data abstraction form records were double-entered using Microsoft Access software (Version 13.0). Verification checks were applied and discrepancies in records were corrected by making reference to the completed data form. The cleaned data were exported to PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc SPSS for statistical analysis. Bivariate analysis was done to ascertain relationship between complications and operating doctor. The relationship between acute retention and operating doctor could not be ascertained. This is because the expected frequency of one of the cells was less than one.

Ethical approval for this study was obtained from Ghana Health Service Ethics Review Committee.

3. RESULTS AND DISCUSSION

3.1 Results

A total of 259 hernia surgeries were performed over the study period. There were 186 (71.8 %)

males and 73 (28.2 %) females with an age range of 1 to 84 years and as shown in Table 1, 66 (25.5%) of them were children (\leq 14years of age) and 193(74.5%) were adults ($>$ 14years of age).

Children in their first decade were the majority (22.4%) age group followed by adult patients in their 5th decade (17.0%) as shown in Fig. 1. This shows a bimodal peak in children under 10 and 40-49 age group.

Inguinal hernia was the most common 196 (75.7%) type of hernia operated occurring in 49 children and in 147 adults. Umbilical hernia was the 2nd most common type of hernia operated overall and in children, but in adults, para umbilical hernia was the 2nd commonest. There was no epigastric, incisional or femoral hernia in children. There were five grades of operating surgeons categorized into two; surgeon (the specialist general surgeon) and non-surgeon

physician (all other operating doctors). A general surgeon performed 165 (63.75%) of the cases whilst 95 (36.7%) were performed by non-surgeons (Resident-8, Senior medical officers, SMO-18, Medical Officers MO-16, House officers(interns) -52. Fifty-two (20.1%) of the surgeries were performed by house officers (interns) under supervision by the general surgeon. House officers are graduates from medical school who are doing their internship in surgery. Medical officers are doctors who are within 3 years post house manship training and senior medical officers are doctors post 3 years of house manship training. Table 2 details the grade of operating doctor and the type of hernia they operated on.

There were 32(12.4%) cases of complicated hernias managed as emergency whilst most of the cases 227(87.6%) were managed as elective cases. Twenty three of the 32 emergency repairs done were inguinal hernias. There were 4

Table 1. Patient characteristics and clinical findings

Age -sex distribution of patients who underwent hernia surgery							
Category	Male, n (%)		Female, n (%)		Total (%)		
Children (\leq 14)	50 (75.6)		16 (24.4)		66(25.5)		
Adult ($>$ 14)	136 (70.5)		57 (29.5)		193(74.5)		
Age category vrs types of hernia							
	Inguinal	Femoral	Epigastric	Umbilical	Paraumbilical	Incisional	Total (%)
children	49	0	0	14	3	0	66(25.5)
Adult	147	1	12	11	18	4	193(74.5)
Total (%)	196(75.7)	1(0.4)	12(4.6)	25(9.7)	21(8.1)	4(1.5)	259(100)
Content of sac in complicated hernia							
Small bowel	17	0	1	1	1	0	20 (7.7)
Large bowel	3	0	0	0	0	0	3 (1.2)
Ileocecal	2	0	0	0	0	0	2(0.8)
omentum	1	0	3	1	2	0	7(2.7)
Total (%)	23(8.9)	0(0)	4(1.5)	2(0.8)	3(1.2)	0(0)	32(12.4)
Condition of content of complicated hernia							
Content	Viable		Gangrenous		Total		
Small bowel	14		6		20		
Large bowel	2		1		3		
Ileocaecal	2		0		2		
Omentum	6		1		7		
Total (%)	24(75)		8(25)		32(100)		
Complications of surgery							
complications	Number (%)						
Acute urinary retention	2(0.8)						
Haematoma	21(8.1)						
Surgical site	12(4.6)						

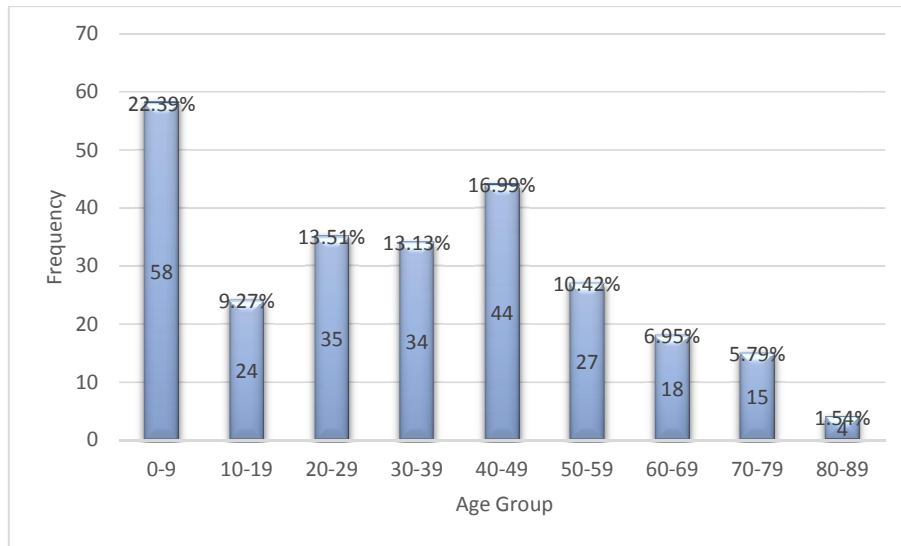


Fig. 1. Age distribution of patients who underwent hernia surgery

Table 2. Type of hernias performed by different category of operating doctor

	Inguinal	Epigastric	Umbilical	Paraumbilical	Incisional	Femoral	Total (%)
Surgeon	120	9	19	12	4	1	165(63.7)
Non-surgeon	76	3	6	9	0	0	94(36.3)
Total (%)	196(75.7)	12(4.6)	25(9.7)	21(8.1)	4(1.5)	1(0.4)	259(100)

complicated epigastric hernias, 3 paraumbilical and 2 umbilical hernias but no complicated femoral or incisional hernias. Small bowel (23) was the most common content found in the hernia sac followed by omentum (8), large bowel (3) and ileo-caecum (2). As shown in Table 1, 8 out of the 32 complicated hernias contained gangrenous content of which 6 were small bowel, one large bowel and one omentum. This resulted in seven (7) bowel resections and one omental excision.

Mesh repair was the most common 98 (37.8%) technique for posterior wall reinforcement followed by simple suturing 57(22.0%), nylon darn 34 (13.1%), and Bassini repair with Tanner slide 22(8.5%). Herniotomy alone was done for 48 children, one child had herniorrhaphy in addition due to perceived weakness of the posterior wall whilst the remaining had simple suturing for umbilical hernia (14) and paraumbilical hernia (3).

There were 35 early complications, hematoma being the most common (21), followed by

surgical site infection (12) and acute retention of urine (2).

As shown in Table 3, the proportion of complications in non-surgeons were higher (haematoma 10.5%, SSI 5.3%, AROU 1%) compared with that of surgeons. (Haematoma 6.7%, SSI 4.3%, AROU 0.6%). However, there was no statistically significant relation between the grade of operating surgeon and Haematoma ($p = 0.28$) and surgical site infection ($p = 0.76$).

3.2 Discussion

Hernia constitutes one of the most common surgical disease managed by general surgeons worldwide. Hernia disease has been described as a public health threat which can be solved by surgery [8,9]. More than 200 million people live with inguinal hernia worldwide, constituting 75-77% of all hernia surgeries [1-3]. In this study, inguinal hernia was the most common type of hernia (75%), consistent with the global prevalence.

Table 3. Association between category of surgeon and complications

Variable	Haematoma		p-value
	Yes n (%)	No n (%)	
Surgeon	11(6.7)	153(93.3)	0.28
Non-surgeon	10(10.5)	85(89.5)	
Surgical site Infection			
Surgeon	7.4(4.3)	157(95.7)	0.76
Non-surgeon	5(5.3)	90(95.7)	
Acute retention of Urine			
Surgeon	1(0.6)	163(99.4)	-
Non-surgeon	1(1)	94(98.5)	

Males are more commonly affected by inguinal hernia with a male to female ratio ranging between 7:1 to 10.5: 1 in Ghana [10,11]. In this study, although the male to female ratio of all hernias was 2.5: 1, the male to female ratio of inguinal hernia was 6: 1, consistent with previous studies [10,11].

Burcharth and colleagues in a study described a bimodal age distribution of early childhood and old age for inguinal hernias [12]. This study also describes a bimodal peaking of children younger than 10 years and adults in their 5th decade. The second peak are people in the middle age and productive years hence delayed repair in these age groups obviously affects productivity and economic growth.

Adverse outcomes are usually commoner in areas with low elective repair rates [9,13] Several studies have documented the ratio of emergent to total hernia repairs across the world and this has been used as surgical capacity metric [14]. Emergent hernia repair accounts for 65% of all hernia surgeries in a tertiary hospital in Kumasi [15]. This rate reported some decades ago is unacceptably high. Our study however demonstrates a relatively low rate of 12% over the three-year period. The reasons for the seemingly changing pattern could be the recent increased capacity in the center or increased referrals of complicated hernias from district and private hospitals to the tertiary center.

Thirty-two emergency repairs were carried out in this study. The commonest content was small bowel and omentum. There were 24 viable viscera in the sac whilst 8 of them were gangrenous requiring 7 bowel resections and one omental excision. We recorded a mortality from anastomotic breakdown in an immunosuppressed patient.

There were some early complications of the hernia repair including hematoma, acute retention of urine and surgical site infection. Bruising and hematoma are the commonest early complications after hernia surgery [16]. Similarly, the commonest complication recorded in this study was wound hematoma 21(8.1%), 2 of which required evacuation.

Five grades of doctors with different levels of competence were involved in the hernia surgery. These were categorized into Surgeon and non-surgeon physicians. More than a third of the cases were performed by non-surgeon physicians, majority (54%) of them being house officers. House officers (interns) as part of their training in this center are trained in minor surgeries with hernia repair being the most common procedure. In this study, house officers were supervised to perform 20 % of the cases. Evidence across the world indicates low rate of hernia repair especially in low- and middle-income countries (LMIC) [4,7]. In countries with limited surgical capacity like LMIC, task shifting is predominant [17]. This task shifting is very common in Ghana where there are limited number of surgeons in the district and even in secondary level centers. This is possible when young non-surgeon physicians receive short term training. There has been a campaign to train non- surgeon physicians to increase volumes of hernia surgery in Ghana. These training programme are ongoing in Ghana with some success.

The majority of the hernia surgery in the non-physician group were performed by interns, who stayed in the unit for a maximum of 12 weeks. Wang and colleagues in their study demonstrated that non-surgeon physicians can undergo short term training which can significantly increase capacity for treatment of hernia [7]. This study demonstrates that these

skills can be enhanced to increase capacity of junior doctors. Medical officers assigned to district hospitals can go through some form of standardized training in basic surgical procedures including hernia training workshops before taking up posts. In this regard, the Ashanti Regional Hospital can be used as a training center in the Ashanti region and this can be replicated in other regions and in other countries.

In this study, the complication rates were compared in the two operating surgeons' groups. There was no statistically significant relation between the grade of operating surgeon and the post-operative complications haematoma and surgical site infection. The relationship between acute retention and operating doctor could not be ascertained as a result of very small numbers.

This study demonstrates that even though complications were more likely to occur in non-surgeon physicians, the difference is not statistically significant. A well-structured training programme with a standard way of assessing competence, will help increase capacity to clear the unmet hernia disease.

Some limitations of the study are important to mention. Firstly, the outcomes were a select few because of problems with documentation. The nature of the study did not allow long term follow up on these patients to study long term outcomes like recurrence and chronic pain. SSI was not studied for one year especially when mesh repair was carried out. Secondly, there was no standardized way of assessing competence leading to generalization.

Further studies using standardized means of assessing competence should be conducted.

4. CONCLUSION

External hernias are common in children and in adults in their productive years in Kumasi. With a well-planned training program and standardization in assessing competence, non-surgeon physicians can perform hernia surgeries with comparable outcomes to that of surgeons.

CONSENT

It is not applicable.

ETHICAL APPROVAL

The study did not involve contact or interview with human subjects. Surgeries done previously were reviewed. Ethical approval was obtained from Ghana Health Service Ethical review committee with registration number: GHS-ERC018/08/19.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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