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ORIGINAL ARTICLE

Barriers to inguinal hernia repair in Ghana: prospective, multi-centre cohort study

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Inguinal hernia (IH) is the most common general surgical pathology in Ghana with hernia repair rate very low. The objective was to assess patient-perceived barriers to IH repair in Ghana and identify predictors of experiencing delays until surgery. A multicenter prospective study was conducted during the Ghana Hernia Society outreach. Data regarding diagnosis using Kingsnorth's classification of IH, age of patients, duration of hernia, reason for delay in repair, insurance status, American Society of Anesthesiologists (ASA) class, travel distance, region, hospital, and waiting times were obtained from patients and folders. Multivariable linear regression models were constructed to analyze delay until surgery and Kingsnorth's classification while controlling for the covariates of age, insurance status, ASA class among others. The most common reasons were queues for surgery (23%), poverty (10%), and seeking traditional medicine (9%). On multivariate linear regression, increasing age and ASA class III were predictors of longer delays. Patients experienced significant increase of 1.1 years delay to surgery for every 10 year increase in of age. ASA Class III patients were significantly more likely to be delayed by 11.5 years compared to ASA Class I patients. Efforts should be made to address and overcome the barriers to IH repair identified.
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Key words : Inguinal hernia, hernia repair, Kingnorth's classification of inguinal hernia, poverty

INTRODUCTION

Lack of adequate data regarding surgical diseases has led to a neglect of both preventive and emergency surgical care in low- and middle-income countries (LMICs). Inguinal hernia (IH) is one such common surgical disease that has been ignored in most African countries (Nordberg *et al.,* 2002). Numerous deaths occur almost daily in remote rural communities across Africa due to lack of adequate surgical care for IH disease.

In Ghana there are an estimated 530,082 hernias in need of repair (Beard *et al.,* 2013). However, the hernia repair rate is only 30 per 100,000, leaving thousands of patients with IH in need of surgical correction (Beard *et al.,* 2013). With IH being so prevalent and the rate of surgical repair being so low, it is important to identify barriers that prevent patients from undergoing IH repair. Therefore, the goals of this study were to perform a multi-institutional study to assess patient-perceived barriers to IH repair in Ghana and identify predictors of experiencing a delay until surgery.

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MATERIALS AND METHODS

This was a multicenter prospective cohort study conducted in Ghana during the Ghana Hernia Society outreach programmes after obtaining consent for surgery and participation in the research. Data was obtained by interviewing all patients who had their inguinal hernia repaired

during these programmes. The programmes aimed to train Medical Officers in mesh repair and took place in 19 hospitals in seven regions out of ten regions: Two 2 teaching hospitals; three 3 regional hospitals and fourteen 14 district hospitals. Information was obtained regarding diagnosis using Kingnorth's classification, age of patients, duration of inguinal hernia, reason hernia was not repaired earlier, insurance status, American Society of Anesthesiologists (ASA) class, travel distance, region, hospital, and risk factors including wait times.

Statistical analysis

Descriptive statistics were reported as counts and percentages for categorical variables and means and standard deviations for normally distributed continuous variables. Multivariable linear regression models were constructed to analyze delay until surgery and Kingsnorth's classification of IH while controlling for the covariates of age, insurance status, ASA class, travel distance, region, hospital, and risk factors. Sex was excluded as a covariate as the entire cohort was male. Variables were selected if they were significant ($p < 0.05$) or they changed the coefficient of the primary variable by more than 10%. No covariates were excluded based on this methodology for analysis of delays until surgery. Only delay in surgery and region were included in the model for Kingsnorth's classification as all the other variables were deemed not to be confounders.

RESULTS

The study included a total of 553 participants. Patient demographics, health insurance, characteristics of IH, and type of anaesthesia are listed in Table 1.

The most common reason for delay was not thinking that the IH was a problem, reported by 39%. The next common reason was wait time for surgery (23%), no money (10%), and seeking traditional medical treatment (9%). Other reasons are listed in Table 2.

On multivariate linear regression, increasing age ($p < 0.001$) and ASA class III ($p < 0.001$) were predictors of longer delays. Patients experienced significant increase of 1.1 years delay to surgery for every increase in 10 years of age. ASA Class III patients were significantly more likely to be delayed by 11.5 years compared to ASA Class I patients. Patients unaware that they had a problem, and patients who had the longest wait times had longer delays of 9.9 and 6.3 years, respectively.

Table 1: Demographics

Age	48.2 ± 19.1
NHIS	99.4
RIH	63.6
LIH	36.4
Kingsnorth	
H1	8.9
H2	27.9
H3	50.7
H4	12.5
Anesthesia	
Local	64.3
Spinal	31.9
General	3.8

** NHIS –National Health Insurance Scheme*
** RIH – Right inguinal hernia*
**LIH – Left inguinal hernia*

Table 2: Reason for delay in obtaining surgical intervention

Reason for Delay	Percent (%)
Unaware of Problem	40.0
Wait Time	23.3
Unable to Pay	10.9
Medical Management	14.6
Afraid of Surgery	5.0
Personal	4.8
No Reason	1.0
No Access	0.2
Not Indicated	0.2
Total	100.0

Values presented as percent

DISCUSSION

In this multicenter study we found that the most common reason for delay to IH repair was that the patient was unaware that the hernia was a problem. This may be due to a multitude of reasons, such as the hernia does not cause pain, or symptoms were tolerable. Löfgren et al studied the prevalence of groin hernia in eastern Uganda and found that about 50% of men with hernia had no pain (Löfgren, 2014). Delay in IH repair may also be because patients tolerate their symptoms for years

Table 3: Predictors of Delays Until Surgery

Variable	OR	P value
Age	**0.11**	**<0.001**
NHIS	-4.03	0.509
ASA Class		
I	ref.	
II	-0.25	0.832
III	**11.5**	**< 0.001**
Travel Distance	0.011	0.326
Region		
NR	ref.	
ASR	-4.09	0.039
BAR	0.71	0.698
UER	1.87	0.701
UWR	-3.26	0.317
VR	-3.2	0.315
Hospital		
Tamale Teaching Hospital	ref.	
Yendi	5.11	0.029
Adjusted Wait Times		
Unaware of Problem	9.92 ± 0.76	0.001
Wait Time	6.29 ± 1.00	0.001
Unable to Pay	10.11 ± 1.50	0.001
Medical Management	11.20 ± 1.29	0.001
Afraid of Surgery	14.17 ± 2.13	0.001
Personal	9.29 ± 2.42	0.001
No Reason	5.52 ± 4.70	0.241
Not Indicated	7.1 ± 10.42	0.498

**NR – Northern Region*
**ASR – Ashanti Region*
** BAR – Brong-Ahafo Region*
** UER – Upper East Region*
** UWR – Upper West Region*
**Volta Region*

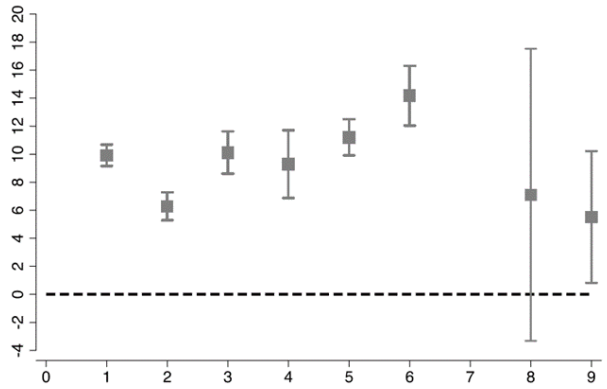

Figure 1: Wait times by reason for delay.

1 = no problem, 2 = wait time, 3 = unable to pay, 4 =personal, 5 = failed medical management, 6 = afraid, 7 = no access, 8 = not indicated, 9 = no reason.

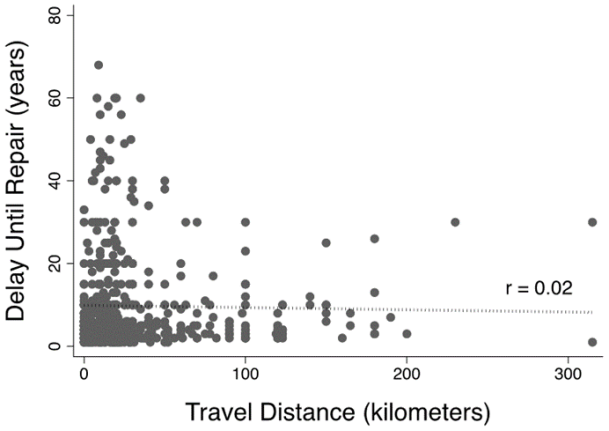

Figure 2: Travel distance was not related to longer delays in seeking treatment (r = 0.02).

before presenting for repair. Mitura *et al.,* found that Ghanaian patients had hernia symptoms for an average of 3.4 years before undergoing surgical repair, and only 12.6% of patients had sought medical assistance during the time their hernia was present (Mitura, 2015). In Nigeria the average duration of hernia-related symptoms before presentation was 4.3 years (Mbah, 2007). These factors may contribute to the fact that, compared to European patients with hernias, a larger proportion of African patients with hernias present as emergencies and require emergent rather elective hernia repair (Mbah, 2007). Up to 20% of hernias in African nations may present emergently with obstruction or strangulation (Mbah, 2007).

Another common reason for delay to IH repair was the wait time until surgery could be performed. Löfgren et al estimated that the annual surgical correction rate of groin hernias was less than 1% in eastern Uganda (Löfgren *et al.,* 2014). In Ghana the hernia repair rate is 30 per 100,000 (Beard *et al.,* 2013). Thus, the rate of hernia repair appears to be low, leaving many patients in need of surgical correction of their hernia. Beard et al estimated that the prevalence of IH in Ghana is 3.15%, and that, at the time of article publication, there were 530,082 hernias in need of repair (Beard *et al.,*

2013). At the current hernia repair rate in Ghana, an estimated backlog of one million hernias in need of repair will develop by the year 2022 (Beard *et al.,* 2013). Similarly, in Tanzania an estimated backlog of 995,874 inguinal hernias in need of repair will develop by the year 2023 [Beard et al., 2014]. This backlog will likely lead to longer wait times for patients in need of hernia repair.

Interestingly, the inability to pay for IH repair was only a factor for 10.9% of the participants interviewed. This may be because the cost of IH repair has been greatly reduced since the implementation of mosquito net mesh for IH repair. The cost of mosquito net mesh can be less than US $2 (Clarke *et al.,* 2009; Yenli *et al.,* 2017; Rouet *et al.,* 2018), compared to US $100 for comparable commercial mesh (Clarke *et al.,* 2009). Use of mosquito net mesh has been shown to be both cost-effective and safe, as there is no difference in hernia recurrence or post-operative complications when comparing IH repair with mosquito net mesh to IH repair with commercial mesh (Löfgren *et al.,* 2016). Nonetheless, other studies have reported that more than 50% of patients with groin hernias stated that inability to afford health care was the reason that hernia repair was not performed (Patel *et al.,* 2014).

We also found that significant predictors of delay to IH repair were increasing patient age and higher ASA class. Löfgren *et al.,* found a significant association between the presence of a groin hernia and age, with older age being associated with a greater prevalence of hernia (Löfgren *et al.,* 2014). Moreover, 61% of patients who underwent hernia surgery were between 35-64 years old, while patients aged 65-74 years accounted for 10% of hernia repairs and patients older than 74 years accounted for only 6% of hernia repairs (Löfgren et al., 2014). In addition, older patients with a long-standing hernia may develop associated diseases such as urinary tract obstruction and cardiopulmonary disease, thus making hernia repair a riskier procedure (Ohene-Yeboah and Abantanga, 2011). Such factors may contribute to the delay to IH repair.

Yet another interesting finding was that travel distance was not significantly associated with delay to IH repair. Patients appeared to be willing and able to travel long distances in order to undergo surgical repair of their hernia. This was similar to published reports. Mitura et al performed hernia repairs in northern Ghana and found that patients traveled up to 90 km to undergo IH repair (Mitura et al., 2015).

CONCLUSION

This study had some limitations. There may be other barriers to IH repair that were not accounted for in this study. For instance, some patients were unaware that the personnel or facilities to perform hernia repair were available. Another limitation of this study was that some data, such as duration of symptoms, were obtained by self-report. Such variables might have been susceptible to recall bias. However, a strongpoint of this study was that it elucidated the reasons that Ghanaian patients were not seeking treatment for a surgically correctable condition. Given the great number of inguinal hernias in need of repair in Ghana, efforts should be made to address and overcome the barriers to IH repair identified in this study. Such efforts should include education, use of low-cost mesh and improving access to the personnel and facilities able to perform hernia repair.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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