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Follow-up trends after emergency department discharge for acutely symptomatic hernias: A southwestern surgical congress multi-center trial

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ABSTRACT

Background: The objective of this multi-center study was to examine the follow-up trends after emergency department (ED) discharge in a large and socioeconomically diverse patient population.
Methods: We performed a 3-year retrospective analysis of adult patients with acutely symptomatic hernias who were discharged from the EDs of five geographically diverse hospitals.
Results: Of 674 patients, 288 (43%) were evaluated in the clinic after discharge from the ED and 253 (37%) underwent repair. Follow-up was highest among those with insurance. A total of 119 patients (18%) returned to the ED for hernia-related complaints, of which 25 (21%) underwent urgent intervention.
Conclusion: The plan of care for patients with acutely symptomatic hernias discharged from the ED depends on outpatient follow-up, but more than 50% of patients are lost to follow-up, and nearly 1 in 5 return to the ED. The uninsured are at particularly high risk.

Introduction

Expeditious repair of acutely symptomatic hernias is recommended as elective repair is associated with improved quality of life and better function.[1–3] Various patient and hernia characteristics have been associated with the need for emergent repair including but not limited to age, medical comorbidities, and prior repair.[3,4] Payor status, specifically the lack of insurance, has also been associated with a higher likelihood of initial nonoperative management, in addition to an increased risk for hernia-associated complications and mortality.[3,5,6]

In a previous single center study, the majority of patients with symptomatic hernias discharged from the emergency department (ED) of an urban public hospital never received outpatient follow-up and even fewer underwent operative intervention.[7] Prior research has demonstrated significant healthcare disparities amongst the uninsured patient populations presenting with common acute care surgery (ACS) conditions.[8–11] Although watchful waiting has been advocated in minimally symptomatic patients with inguinal hernias,[12] data on the natural history and follow-up trends for patients with acutely symptomatic hernias has not been extensively examined. The objectives of this multi-center study were to examine the rate of follow-up and incidence of herniorrhaphy among patients with symptomatic hernias discharged from the ED and to evaluate the effect of insurance status on outcomes.

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Methods

We performed a 3-year multicenter retrospective cohort analysis of patients presenting to the ED at 5 geographically distinct hospitals with acutely symptomatic hernias (including inguinal, ventral, umbilical, or incisional) who were subsequently discharged from the ED following acute care surgery consultation. The diagnosis of a symptomatic hernia was confirmed by an ACS team on the basis of history, physical exam, and radiographic imaging, where applicable. Patients with acute indications for repair, including strangulation and high-grade bowel obstruction, were excluded from the analysis. Patients with incarcerated hernias were included in the study.

Variables analyzed were age, gender, race, insurance status (categorized as private, public, or no insurance), smoking status (current or past), body mass index (BMI), and the presence of the most common medical comorbidities (diabetes mellitus, hypertension, congestive heart failure, cerebral vascular accident, coronary artery disease, prior myocardial infarction, chronic obstructive pulmonary disease, cirrhosis).

The primary outcomes measures were incidence and timing of clinic follow-up and repair (elective or urgent). Urgent repair was defined as requiring inpatient admission with expedited repair under conditions precluding discharge (intractable pain, strangulation, obstruction). Clinic follow-up was defined as evaluation of the patient in clinic by a surgeon. Secondary outcomes were ED return visits (after the index visit to the ED but before surgery) and postoperative complications including surgical site infections (both superficial and deep), wound dehiscence, hematoma, or early recurrence. Duration of follow-up was 18 months after the last data collection date for a variable time of 2–5 years.

Chi-square and odds ratios were used to perform a bivariate comparison of categorical variables and the non-parametric Wilcoxon test was applied for continuous variables. Fisher exact test was applied if the expected cell count was less than 5 for one or more cells. We performed additional multivariate analysis in the form of logistic regression by stratifying outcomes by insurance type. This study was approved by the Los Angeles Biomedical Research Institutional review board (IRB) at the primary study site and the local IRB at all other participating centers.

Results

During the study period, there were 674 patients who met inclusion criteria, of which 342 (51%) were lost to follow up (Fig. 1). A total of 253 hernia repairs were performed, representing 38% of the 674 patients discharged from the ED for an acutely symptomatic hernia with plans for outpatient follow-up. Patient demographics and hernia characteristics can be seen in Tables 1 and 2, respectively.

Of 674 patients evaluated in the ED with an acutely symptomatic hernia, 288 (43%) were evaluated in clinic and 386 (57%) were not seen in clinic. Of those seen in clinic, 209 (73%) underwent repair, of which 10 (5%) were urgent and 199 (95%) were elective. The uninsured had a significantly lower rate of clinic follow-up than those with insurance ($p < 0.0001$). Time to clinic varied greatly (median 39 days, IQR 15–77), and it varied significantly across insurance types: no insurance (median 13 days, IQR 5–60), public insurance (12d, IQR 5–25), and private insurance (6d, IQR 3–11) (Table 3). Median time from clinic to OR was not significantly different across the three insurance types (Table 3).

A total of 253 hernia repairs were performed, representing 38%

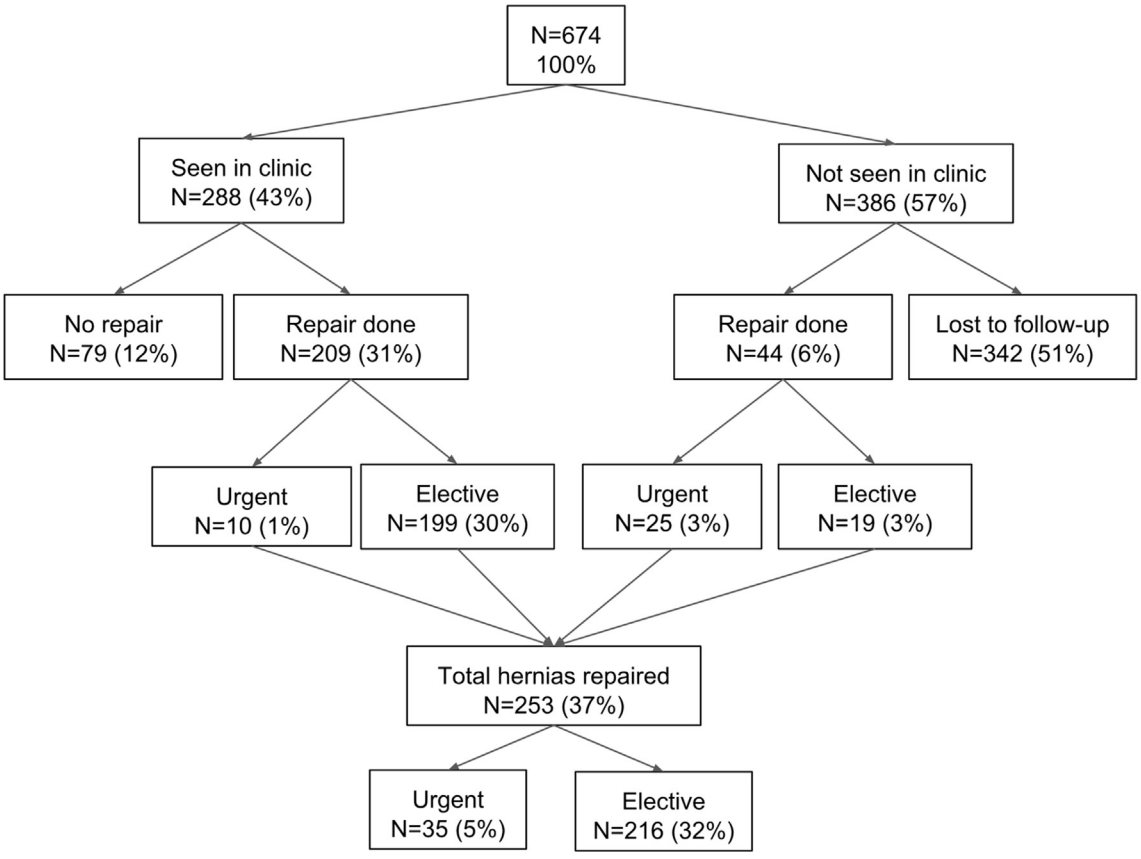

Fig. 1. Patients seen in the Emergency Department with Acutely Symptomatic Hernias.

Table 1
Patient demographics of operative vs non-operative groups.

Characteristic	Overall cohort (N = 674; 100%)	Operative (N = 253; 37%)	Non-operative (N = 421; 63%)	Odds ratio (95%CI[a])	P value
Age (median [IQR[b]])	52 [40–63]	55 [44–67]	50 [38–60]	N/A	<0.001
Male sex n (%)	460 (68%)	194 (77%)	266 (63%)	1.9 (1.4–2.7)	0.0003
Race n (%)					
Caucasian	424 (63%)	199 (79%)	225 (53%)	3.2 (2.3–4.6)	<0.0001
Hispanic	137 (20%)	37 (15%)	100 (24%)	0.5 (0.36–0.83)	0.004
African American	90 (13%)	20 (8%)	70 (17%)	0.43 (0.25–0.73)	0.0013
Asian	10 (1.5%)	5 (2%)	5 (1.2%)	1.7 (0.48–5.85)	0.41
Other	21 (3%)	1 (<1%)	20 (5%)	0.08 (0.01–0.60)	0.0016
Insurance n (%)	668 (99%)	253 (38%)	415 (62%)	N/A	<0.001
No insurance	217 (32%)	57 (23%)	160 (39%)		
Public	252 (38%)	104 (36%)	148 (36%)		
Private	199 (30%)	92 (36%)	107 (26%)		
BMI[c] (median [IQR])	29 [26–36]	28 [25–33]	31 [26–37]	N/A	0.008
Current Smoker n (%)	285 (44%)	122 (48%)	163 (41%)	N/A	0.05
Diabetes n (%)					
- PO[d]	55 (9%)	18 (7%)	37 (10%)	N/A	0.28
- IDDM[e]	21 (3%)	6 (2%)	15 (4%)		
Hypertension n (%)	226 (34%)	90 (36%)	136 (32%)	1.15 (0.83–1.61)	0.40
Congestive heart failure n (%)	28 (4%)	12 (5%)	16 (4%)	1.26 (0.58–2.70)	0.56
Hyperlipidemia n (%)	91 (14%)	38 (15%)	53 (13%)	1.22 (0.78–1.92)	0.38
Cerebral vascular accident n (%)	19 (3%)	6 (2%)	13 (3%)	0.76 (0.29–2.03)	0.58
Coronary artery disease n (%)	40 (6%)	18 (7%)	22 (5%)	1.39 (0.73–2.64)	0.32
Myocardial infarction n (%)	14 (2%)	4 (2%)	10 (2%)	0.66 (0.20–2.12)	0.48
Chronic obstructive pulmonary disease n (%)	35 (5%)	16 (6%)	19 (5%)	1.42 (0.72–2.82)	0.31
Cirrhosis n (%)	19 (6%)	4 (6%)	15 (6%)	1.1 (0.36–3.48)	0.85

[a] CI: Confidence interval.
[b] IQR: Interquartile range.
[c] BMI: body mass index.
[d] PO: Diabetes controlled with oral medications.
[e] IDDM: Insulin dependent diabetes.

Table 2
Hernia characteristics of operative vs non-operative cohort.

Characteristic	Overall cohort (N = 674; 100%)	Operative (N = 253; 37%)	Non-operative (N = 421; 63%)	Odds ratio (95%CI)	P value
Pain present n (%)	521 (81%)	190 (77%)	331 (83%)	0.71 (0.48–1.06)	0.10
Incarcerated n (%)	69 (11%)	42 (17%)	27 (7%)	2.8 (1.66–4.64)	<0.0001
Prior repair n (%)	61 (10%)	24 (10%)	37 (9%)	1.16 (0.67–2.0)	1.16
Inguinal n (%)	298 (44%)	144 (57%)	154 (37%)	2.29 (1.67–3.15)	<0.0001
Ventral n (%)	128 (19%)	22 (9%)	106 (25%)	0.28 (0.17–0.46)	<0.0001
Umbilical n (%)	213 (32%)	78 (31%)	135 (32%)	0.94 (0.67–1.32)	0.74
Incisional n (%)	66 (10%)	17 (7%)	49 (12%)	0.55 (0.31–0.97)	0.04

Table 3
Follow-up trends for operative vs non-operative cohort.

Characteristic	Overall cohort (N = 674; 100%)	Operative (N = 253; 37%)	Non-operative (N = 421; 63%)	Odds ratio (95%CI)	P value
# ED[a] visits n (%)					
1 return visit	134 (20%)	64 (25%)	70 (17%)	1.70 (1.16–2.49)	0.006
- Hernia specific	115 (17%)				
- Other	19 (3%)				
2 return visits	51 (8%)	26 (10%)	25 (6%)	1.81 (1.02–3.22)	0.04
3 return visits	20 (3%)	8 (3%)	12 (3%)	1.1 (0.45–2.76)	0.82
Clinic follow-up n (%)	288 (43%)	209 (83%)	79 (19%)	20.56 (13.69–30.89)	<0.0001
Time to clinic in days (median [IQR])	8 [4–20]	8 [4–16]	12 [4–30]	N/A	0.10
Time to OR from clinic in days (median [IQR])	14 [6–35]	14 [6–35]	N/A	N/A	N/A
Time to OR from ED in days (median [IQR])	28 [14–90]	28 [14–90]	N/A	N/A	N/A

[a] ED: emergency department; visits are return visits after index presentation.
[b] IQR: interquartile range.

of the 674 patients discharged from the ED for an acutely symptomatic hernia with plans for outpatient follow-up. Predictors of operative intervention can be seen in Tables 1–3. The highest predictors of receiving surgery were clinic visit (OR 20.56, 95%CI 13.69–30.89, $p < 0.001$), followed by caucasian race (OR 3.2, 95% CI 2.2–4.6), incarceration (OR 2.78, 95%CI 1.66–4.64, $p < 0.0001$), and inguinal hernia type (OR 2.3, 95%CI 1.67–3.15, $p < 0.001$). Reasons that patients did not receive surgery after being evaluated in clinic were cited as medical comorbidities in 34 patients (38%), refusal of surgery in 23 patients (26%), did not actually have a hernia upon re-evaluation in 15 patients (17%), preoperative weight loss required in 9 patients (10%), or other reasons (9%).

Among patients undergoing surgery, 216 (86%) were performed electively and 35 (14%) were performed urgently. Emergent surgery was more common in the uninsured than those with either type of insurance ($p = 0.006$). The strongest predictors of requiring urgent

surgery were presence of pain (OR 11.28, 95%CI[1.51–84.5] p = 0.003), ventral hernia type (OR 4.6, 95%CI[1.76–12.18], p = 0.0008) and incarceration (OR 3.2, 95%CI[1.45–7.14] p = 0.003). Clinic visit was strongly negatively associated with emergent surgery (OR 0.03, 95%CI[0.01–0.08], p < 0.0001). Complication rate was 8.5%. Serious complications included need for exploratory laparotomy (N = 11 in urgent surgery group vs N = 4 in elective surgery group) and bowel resection (N = 3 in emergent surgery group, N = 0 in elective surgery group).

A total of 134 patients (20%) returned to the ED after initial discharge, with the most common reasons being pain (81%), obstruction or strangulation (9.6%), unrelated medical condition (5.6%), or other (4%) (Table 3). Patients with private insurance were much less likely to return to the ED than those with public insurance or uninsured (p = 0.004). Return visits to the ED were associated with a higher likelihood of getting surgery after one (OR 1.70, 95%CI 1.16–2.49, p = 0.006) and two ED return visits (OR 1.81, 95% CI 1.02–3.22, p = 0.04), but not with additional (3 or greater) returns to the ED.

We stratified by insurance type to determine if male gender and caucasian race were still predictive of receiving surgery (Table 4). When stratified for insurance type, male gender and any type of race were not predictive of getting surgery amongst those with no insurance. However, amongst patients with public or private insurance, male gender was predictive of hernia repair (OR 1.75, 95% CI 1.01–3.02, p = 0.04). Caucasian race was predictive of surgery among those with public insurance (OR 1.75, 95%CI 1.01–3.02, p = 0.001) and private insurance (OR 6.96, 95%CI 2.93–16.55, p < 0.0001).

Discussion

In the present study, over 50% of patients discharged from the ED with clinic follow-up for an acutely symptomatic hernia were lost to follow-up. A majority of the institutions involved in this project offer discounted services or financial assistance for those in need, and therefore inability to pay was not likely a contributing factor to this high loss of follow-up. Improving patient education at the time of initial presentation and establishing a structured system such as post-discharge phone calls or reminder letters may improve continuity of care. Examination of the demographics, hernia characteristics, and outcomes of patients lost to follow-up should be a goal of future research.

Almost 20% of patients returned to the ED with hernia-related complaints. Overall, clinic follow-up rate was 43%, which is nearly two-times the rate found in a prior study (23% in Spence et al., 2017). The increased incidence of follow-up may be due to the larger and more heterogeneous patient population which included a higher proportion of insured patients. Prior research examining the effect of insurance status on outcomes concluded that insured individuals were significantly more likely to be seen in a follow-up appointment.[13,14] Although the time to clinic varied greatly between the insurance groups, the time from clinic to the operating room did not differ significantly, indicating the time from the ED to the clinic may be the rate limiting step in scheduling definitive management of acutely symptomatic hernias.

A number of positive predictors of either not receiving surgery or requiring urgent surgery were identified in this study. The patient factors that are significantly associated with hernia recurrence[15] and complications[2,16] are often times the reasons why surgeons avoid expeditiously operating on these patients before medical optimization. Despite suboptimal conditions such as in those with higher BMI, DM, or smokers, we may consider repair in those hernias that have a higher likelihood of progression to emergent repair upon first presentation rather than discharging with outpatient follow-up.

When the goal of discharging patients with follow-up is to expedite outpatient management with subsequent definitive operation, returns to the ED before definitive clinic follow-up and repair represent a failure of this treatment plan. The return rate to the ED was approximately 20%, similar to prior studies[1,7,17] and returns to the ED were positive predictors of requiring emergent surgery. The uninsured were more likely to re-present to the ED after discharge, consistent with prior findings.[18] Increased visits to the emergency department are higher in those without consistent, reliable sources of primary care,[19] like the uninsured, which represents another gap in the system. This lack of follow-up predisposes these patients to an increased risk for urgent surgery and

Table 4
Multivariate analysis of follow-up trends by insurance status for gender and race in non-operative vs operative cohort.

Characteristic	Total	Non-Operative Cohort	Operative Cohort	Multivariate analysis	
				OR (95%CI)	P value
No Insurance					
Male (%)	150	106 (66%)	44 (77%)	1.72 (0.86–3.4)	0.12
Race (%)					
Caucasian	111	77 (48%)	34 (60%)	1.59 (0.86–2.94)	0.14
Hispanic	57	44 (28%)	13 (23%)	0.78 (0.38–1.58)	0.49
AA	30	22 (14%)	8 (14%)	1.02 (0.43–2.4)	0.96
Asian	7	4 (2.5%)	3 (5.3%)	2.17 (0.47–9.99)	0.31
Public Insurance					
Male (%)	166	90 (61%)	76 (73%)	1.75 (1.01–3.02)	0.04
Race (%)					
Caucasian	159	79 (53%)	80 (77%)	2.91 (1.66–5.10)	0.0001
Hispanic	58	41 (28%)	17 (16%)	0.51 (0.27–0.96)	0.04
AA	34	26 (18%)	8 (8%)	0.39 (0.17–0.90)	0.02
Asian	1	0 (0%)	1 (<1%)	N/A	0.23
Private Insurance					
Male (%)	138	64 (60%)	74 (80%)	2.76 (1.45–5.26	0.002
Race					
Caucasian	153	68 (64%)	85 (92%)	6.96 (2.93–16.55)	<0.0001
Hispanic	19	12 (11%)	7 (8%)	0.65 (0.25–1.73)	0.39
AA	35	21 (20%)	4 (4%)	0.19 (0.06–0.56)	0.0012
Asian	2	1 (<1%)	1 (1%)	1.16 (0.07–18.9)	0.91

serious complications, as shown here and in prior studies.[4] At the time of publication of this article, no changes to the authors' management protocols have been implemented in order to optimize follow-up, and this is a target of future intervention.

Gender and any type of race were not predictive of getting surgery amongst those with no insurance. However, amongst patients with insurance, male gender and caucasian race were still predictive of receiving surgery. Racial disparities in healthcare for acute care surgery patients are recognized in database reviews (10, 11, 21). A future direction for research could be why, despite similar insurance status, these racial disparities persist. We did not stratify for race when examining the reasons for not having surgery, including comorbidities, language barrier, and healthcare literacy, and these may be confounding factors in these findings. This is an area we will further investigate in future research.

There are several limitations of the study. First, it is possible that patients discharged from the ED presented to another hospital for care thereby affecting the overall ED return rate in this study. Second, while the findings were statistically significant, the discrepancies in the comorbidities and insurance statuses may be due to undiagnosed conditions or underreporting. Third, 51% of our initial patients were lost to follow-up, indicating some level of selection bias. Fourth, we did not examine costs so cannot draw conclusions regarding cost analysis of inpatient admissions, returns to the ED, or costs of elective vs emergent surgery. Finally, the overall complication rate in this study was quite low. This is likely due to the short duration of follow-up and the potential for underreporting at the time of clinic follow-up.

Conclusion

While the plan of care for patients with acutely symptomatic hernias discharged from the ED often depends on outpatient follow-up, more than 50% of patients are not seen or lost to follow-up and almost 20% return to the ED with hernia-related complaints. Those without access to expeditious clinic follow-up, specifically the uninsured, are at particularly high risk. Surgeons should consider these disparities when deciding upon the optimal timing of hernia repair for patients with symptomatic hernias presenting to the ED. Further research is required in order to better identify the barriers to adequate follow-up in this at-risk patient population and to re-evaluate the role of deferred operative management among patients with acutely symptomatic hernias.

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Conflicts of interest

The authors of the manuscript have no conflicts of interest.

Appendix A. Supplementary data

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