

Watchful Waiting vs Repair of Inguinal Hernia in Minimally Symptomatic Men

A Randomized Clinical Trial

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MANY MEN WITH AN INGUINAL hernia are asymptomatic or minimally symptomatic. They and their physicians sometimes delay hernia repair until emergence of pain or discomfort. Surgical repair, while generally safe and effective, carries long-term risks of hernia recurrence, pain, and discomfort.¹⁻⁴

The natural history of an untreated inguinal hernia is not known. For minimally symptomatic men, the usual basis for recommending surgical repair is to prevent a hernia accident (ie, acute hernia incarceration with bowel obstruction, strangulation of intra-

Context Many men with inguinal hernia have minimal symptoms. Whether deferring surgical repair is a safe and acceptable option has not been assessed.

Objective To compare pain and the physical component score (PCS) of the Short Form-36 Version 2 survey at 2 years in men with minimally symptomatic inguinal hernias treated with watchful waiting or surgical repair.

Design, Setting, and Participants Randomized trial conducted January 1, 1999, through December 31, 2004, at 5 North American centers and enrolling 720 men (364 watchful waiting, 356 surgical repair) followed up for 2 to 4.5 years.

Interventions Watchful-waiting patients were followed up at 6 months and annually and watched for hernia symptoms; repair patients received standard open tension-free repair and were followed up at 3 and 6 months and annually.

Main Outcome Measures Pain and discomfort interfering with usual activities at 2 years and change in PCS from baseline to 2 years. Secondary outcomes were complications, patient-reported pain, functional status, activity levels, and satisfaction with care.

Results Primary intention-to-treat outcomes were similar at 2 years for watchful waiting vs surgical repair: pain limiting activities (5.1% vs 2.2%, respectively; $P=.52$); PCS (improvement over baseline, 0.29 points vs 0.13 points; $P=.79$). Twenty-three percent of patients assigned to watchful waiting crossed over to receive surgical repair (increase in hernia-related pain was the most common reason offered); 17% assigned to receive repair crossed over to watchful waiting. Self-reported pain in watchful-waiting patients crossing over improved after repair. Occurrence of postoperative hernia-related complications was similar in patients who received repair as assigned and in watchful-waiting patients who crossed over. One watchful-waiting patient (0.3%) experienced acute hernia incarceration without strangulation within 2 years; a second had acute incarceration with bowel obstruction at 4 years, with a frequency of 1.8/1000 patient-years inclusive of patients followed up for as long as 4.5 years.

Conclusions Watchful waiting is an acceptable option for men with minimally symptomatic inguinal hernias. Delaying surgical repair until symptoms increase is safe because acute hernia incarcerations occur rarely.

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abdominal contents, or both), but this is a rare event. Only an 1896 report from Berger's Paris truss clinic⁵ and a 1981 report from Colombia⁶ are avail-

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able to assess this risk. Both estimated the annual risk of a hernia accident to be approximately 3 per thousand patients. Whether watchful waiting is a good option has not been critically tested.

We conducted a multicenter clinical trial to compare pain, physical function, and other outcomes in men with asymptomatic or minimally symptomatic inguinal hernias randomly assigned to a strategy of watchful waiting or to receive standard open tension-free repair with mesh. We also sought to assess the safety of watchful waiting

with regard to the natural history of minimally symptomatic untreated hernias and the risk of hernia accidents.⁷

METHODS

Study Population

Participants were men aged 18 years or older and presenting with asymptomatic or minimally symptomatic inguinal hernia (ie, the absence of hernia-related pain or discomfort limiting usual activities or difficulty in reducing the hernia within 6 weeks of screening). Excluded were those with undetectable hernias, local or systemic infection, American

Society of Anesthesiologists physical status⁸ greater than 3, or participation in another clinical trial. Men with minimally symptomatic chronically incarcerated hernias were not excluded. Participants were recruited from 5 community and academic centers (Creighton University, Omaha VA Medical Center, University of Nebraska, Omaha; McGill University, Montreal, Quebec; Marshfield Clinic, Marshfield, Wis; University of Texas Southwestern Medical Center, Dallas VA Medical Center, Dallas; and Lovelace Clinic, Albuquerque, NM). Enrollment of eligible patients began on January 1, 1999, and took place over 2.5 years; patients were followed up for a minimum of 2 years. The trial ended on December 31, 2004. The study was designed to assess primary outcomes at 2 years. Patients enrolled early in the trial were followed up for as long as 4.5 years (median, 3.2 years).

Recruitment

Men were referred by primary care physicians or other surgeons or were self-referred in response to public advertising. Approximately half of the men screened were not eligible for the trial, and 55% of eligible patients declined to give consent to be randomized (FIGURE 1). Information on race/ethnicity was gathered to ensure that a spectrum of individuals was represented in this trial. Race/ethnicity were indicated by the patient on a standard form with choices as defined by the US Census Bureau: Hispanic/Latino or non-Hispanic, white, black or African-American, Asian, native Hawaiian or Pacific Islander, or American Indian or native Alaskan.

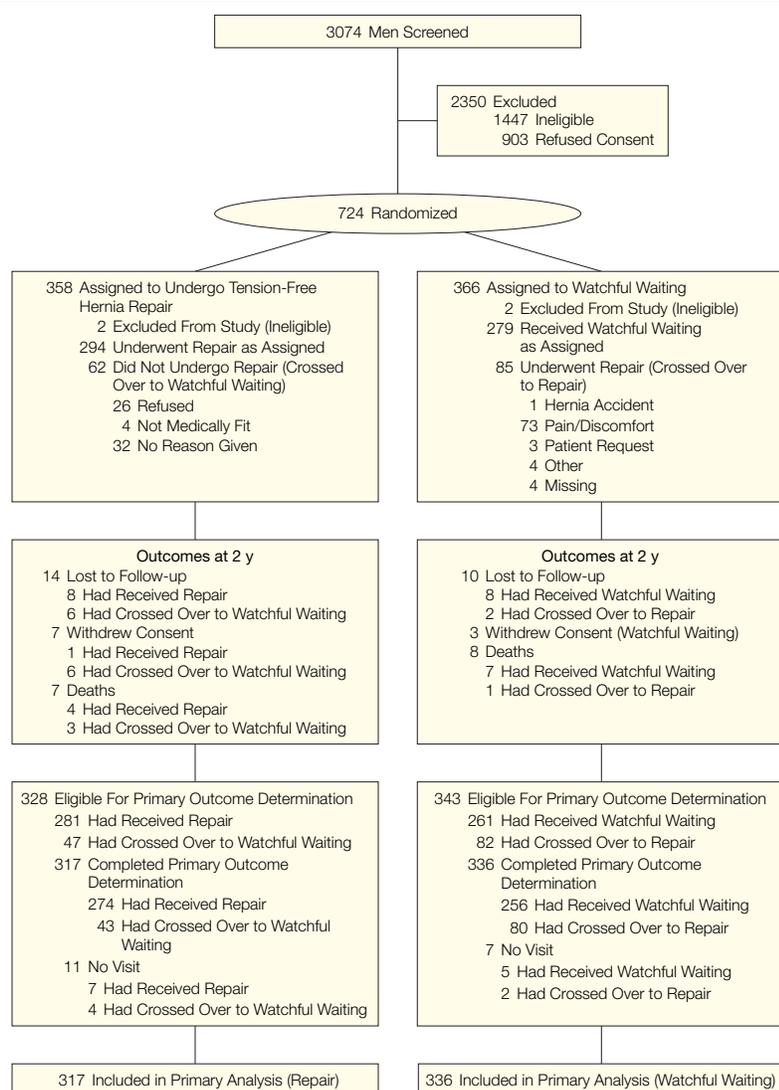
Study Interventions

Participants were randomly assigned to watchful waiting or to receive standard Lichtenstein open tension-free repair.⁹ Details of the watchful-waiting protocols and the surgical repair are described in a previous report.⁷

Follow-up

Patients assigned to watchful waiting were given written instructions to watch

Figure 1. Screened and Enrolled Patients



for hernia symptoms and contact their physician if problems developed; in addition, they were examined at 6 months and yearly after enrollment. While this trial was designed primarily to compare watchful waiting with surgical repair 2 years after randomization, 367 patients were followed up for 3 years and 156 for 4 years; mean and median time of follow-up was 3.2 years.

Randomization, Allocation Concealment, and Implementation of Randomization Scheme

Randomization was stratified by the presence of primary or recurrent hernia, unilateral or bilateral hernia, and study site. The randomization scheme was developed by the study biostatistician and allocated treatments in random block sizes of 2, 4, or 6. Randomization was accomplished by a computer-generated permuted random sequence and assigned by the Veterans Administration (VA) Cooperative Studies Program Coordinating Center, Hines, Ill. After the patient satisfied all inclusion criteria and provided written informed consent, the site coordinator telephoned the VA coordinating center to request that the patient be assigned. Patients were assigned to either watchful waiting or surgical repair in equal proportions. Because of the obvious identity of the study groups, treatment allocation was not blinded to patients or surgeons. Interim unblinded reports were provided to the data and safety monitoring board (DSMB) for safety monitoring, but all site investigators were blinded to interim outcome comparisons until all patients had undergone their final evaluation. Protocol and consent forms were approved by the Hines VA/North Chicago VA Human Studies Subcommittee and by each site's institutional review board.

Determination of Outcomes

The primary outcomes were pain and discomfort interfering with usual activities 2 years after enrollment and change from baseline to 2 years in the physical component score (PCS) of the

Short Form-36 Version 2 health-related quality-of-life survey.¹⁰ Pain interfering with activities was defined as the selection of a level 3 or 4 response to questions with 4 choices: (1) no pain or discomfort due to the hernia or hernia operation; (2) mild pain that does not interfere with activities; (3) moderate or (4) severe levels of pain that interfere with usual activities. These patient-reported variables were measured at baseline and at the 6-month and annual visits.

Postoperative complications of surgical repair were assessed at the 2-week visit and as needed for 3 months. Long-term complications, including hernia recurrence, were assessed at the 6-month and annual visits.⁷ Life-threatening complications were defined prior to the start of the study and were assessed for up to 30 days after surgical repair.

Secondary outcomes included complications, as well as patient-reported outcomes of pain (assessed using four 150-mm visual analog surgical pain scales to measure sensory and emotional aspects of hernia-related pain¹¹), functional status (using the Short Form-36 Version 2 questionnaire¹²), activity levels (using the Activities Assessment Scale¹³), and satisfaction with care (using a 5-point Likert scale). These were measured at baseline, 6 months, and annually. Pain was also assessed at the time of crossover in patients assigned to watchful waiting who ultimately received surgical repair.

Statistical Analysis

The sample size of 720 randomly assigned patients had more than 91% power for each of the primary outcomes at 2 years to detect a 10% difference in the proportion of patients with pain interfering with activities and an 8-point difference in the PCS change from baseline levels, allowing an overall 2-sided type I error rate of 5% and 4 interim analyses of the primary end points. All final analyses and associated confidence intervals for primary and secondary outcomes were adjusted for interim monitoring.¹⁴

Baseline characteristics were compared across groups using a χ^2 test or the Fisher exact test for categorical variables and *t* test or analysis of variance for continuous variables.

Primary analyses comparing watchful waiting with surgical repair for 2-year outcomes were performed on an intention-to-treat basis. Rates for pain interfering with activities at 2 years were compared using O'Brien-Fleming sequential proportion tests. Changes in PCS were compared using O'Brien-Fleming sequential *z* tests.¹⁴

Some patients assigned to watchful waiting requested and received surgical repair, and some patients assigned to receive surgical repair refused surgery and were treated with watchful waiting. Therefore, as an exploratory analysis, primary and secondary outcomes were also examined to account for the intervention received (as-treated analyses). Time-to-crossover estimates were computed using life-table methods.¹⁵ Observations were censored at termination of study participation or at completion of follow-up. Statistical testing of 2-year primary and secondary outcomes used the Dunnett *t* test to account for multiple comparisons of the reference group receiving surgical repair as assigned with the other as-treated groups.¹⁶ Statistical tests were not adjusted for comparisons related to multiple secondary end points. Analyses were performed using SAS version 8.0 (SAS Institute Inc, Cary, NC).

Organization and Monitoring

The principal investigator (R.J.F.) visited each site within the first few months to ensure compliance with study protocols. An executive committee, independent DSMB, and the Hines VA/North Chicago VA Human Studies Subcommittee provided oversight of the study. Site institutional review boards reviewed the study annually. Patient follow-up was deficient in 1 of the original sites, prompting an independent audit of all sites. All data from the single deficient site were purged, the site was dropped from the study, and an alternate site activated.⁷

Table 1. Baseline Demographic Characteristics

Characteristic	Tension-Free Repair (n = 356)	Watchful Waiting (n = 364)	P Value
Age, mean (SD), y	57.5 (13.9)	57.5 (14.1)	.99
Age group, y, No. (%)			
<40	42 (11.8)	41 (11.3)	
40-65	200 (56.2)	198 (54.4)	
>65	114 (32.0)	125 (34.3)	
Race, No. (%)			
White	311 (87.4)	311 (85.4)	.47
Black	17 (4.8)	16 (4.4)	
Asian	3 (0.8)	3 (0.8)	
Multiracial	12 (3.4)	23 (6.3)	
No response	13 (3.7)	11 (3.0)	
Education, mean (SD), y	13.9 (2.7)	14.2 (2.7)	.09
Private health insurance, No. (%)	279 (78.3)	285 (78.3)	.99
Employment, No. (%)			
Employed	221 (62.0)	213 (58.5)	.61
Disabled/unemployed	18 (5.1)	22 (6.0)	
Retired	117 (32.9)	129 (35.5)	

RESULTS

Baseline Patient Characteristics

Between January 1999 and December 2002, 3074 men were screened and 1627 initially met the eligibility criteria. Of these, 724 provided informed consent and were randomly assigned to watchful waiting (366) or surgical repair (358). Two patients were excluded from analysis from each group because it was later determined by the DSMB that eligibility criteria were not met. The 2-year follow-up period ended in December 2004. Eighty-five (23%) of 364 patients assigned to watchful waiting had received surgical repair within 2 years, and 62 (17%) of 356 patients assigned to receive surgical repair did not undergo repair (Figure 1).

Baseline characteristics of the patients are given in TABLE 1 and TABLE 2 for intention-to-treat groups. The mean age of the population was 57.5 years (SD, 14), and demographic characteristics, coexisting conditions, and American Society of Anesthesiologists classifications⁸ were similar between groups. Exceptions were greater body mass index and less sedentary and ambulatory activities in patients assigned to receive surgical repair; more patients were assigned to watchful waiting whose hernias had enlarged within the previous 6 weeks. Most patients

(86%) were white; 5% were black; and 9% were Asian, mixed race, or gave no response.

Operative Findings

In patients receiving surgical repair and those assigned to watchful waiting who crossed over to receive surgical repair, hernia types were determined at time of repair using the Nyhus classification.¹⁷ Among patients undergoing repair, indirect inguinal hernias comprised 53% of hernias (type 1=12%, type 2=29%, type 3b=12%); direct inguinal hernias (type 3a), 41%; and recurrent hernias, 6%. General anesthesia was used in 51%, spinal anesthesia in 10%, and local anesthesia in 37%. Fourteen percent of patients receiving surgical repair had bilateral repair. Seven patients had missing operative data.

Complications and Deaths

The rate of complications was similar among those who were assigned to and received surgical repair (21.7%) and those assigned to watchful waiting who crossed over to receive surgical repair (27.9%) ($P = .30$). Three intraoperative complications (a wound hematoma requiring return to the operating room, postanesthetic hypertension, and an ilioinguinal nerve injury) were

reported in all patients who received surgical repair (0.8%). Postoperative complications (90 events) reported in 85 patients (22.3%) included wound hematomas (23 [6.1%]), scrotal hematomas (17 [4.5%]), urinary tract infections (8 [2.1%]), wound infections (7 [1.8%]), orchitis (6 [1.6%]), seromas (6 [1.6%]), urinary retention (1 [0.3%]), and other minor complications (22 [5.8%]). One life-threatening complication occurred in each of 3 patients receiving surgical repair: postoperative bradycardia, deep venous thrombosis, and postoperative hypertension requiring hospitalization. By 2 years, recurrence of the hernia had occurred in 3 patients (1.0%) assigned to receive surgical repair and in 2 patients (2.3%) assigned to watchful waiting who crossed over to receive surgical repair ($P = .31$). When assessed at 3 months postoperatively, 13 patients (3.4%) receiving surgical repair experienced groin pain and 2 patients (0.5%) experienced leg pain.

One acute hernia incarceration without strangulation occurred in a watchful-waiting patient 4 months after enrollment; emergency surgical repair was complicated by a wound hematoma. There were 22 deaths among enrolled patients (10 among surgical repair and 12 among watchful-waiting patients, $P = .70$), with 15 occurring within 2 years (7 among surgical repair and 8 among watchful-waiting patients, $P = .83$); none of the deaths were attributed to the study.

Outcomes at 2 Years

Of the original 364 watchful-waiting and 356 surgical repair patients, 21 and 28 died or withdrew consent within 2 years, respectively, leaving 94.2% and 92.1% who could have been evaluated at 2 years. Of these, 7 and 11 in the watchful-waiting and surgical repair groups, respectively, were lost to follow-up, leaving 92.3% and 89.0% who completed 2-year follow-up and who were included in analyses of the primary and secondary outcomes.

Primary Outcomes. At 2 years, intention-to-treat analyses showed that

pain interfering with activities developed in similar proportions in both groups (5.1% for watchful waiting vs 2.2% for surgical repair; difference 2.86%; 95% confidence interval, -0.04% to 5.77%; $P = .52$) (FIGURE 2). Mean 2-year PCS change from baseline was not significantly different: watchful-waiting patients improved by 0.29 points (of 100) and surgical repair patients improved by 0.13 points (difference, 0.16; 95% confidence interval, -1.2 to 1.5) (FIGURE 3). A sensitivity analysis adjusting for stratification factors and imbalance in baseline characteristics (ie, body mass index, Activities Assessment Scale, and recent hernia enlargement) yielded almost identical results.

In the as-treated analyses, 47.1% of patients assigned to watchful waiting who crossed over to receive surgical repair had developed pain that interfered with their activities at the time of crossover. Eighty-six percent reported some degree of pain and discomfort as their reason for requesting repair. By the time of the 2-year interview, however, the percentage of patients who had pain interfering with activity was not significantly greater in the patients who had crossed over (8.6% in the crossover group vs 1.5% in the group receiving surgical repair as assigned; difference, 7.1%; 95% confidence interval, -0.63% to 14.99%) (Figure 2). Patients assigned to watchful waiting who crossed over to receive surgical repair reported significantly larger improvement from baseline in PCS relative to patients receiving surgical repair as assigned (difference, 2.50; 95% confidence interval, 0.01 to 5.0; $P = .01$) (Figure 3).

Secondary Outcomes at 2 Years. Both groups had less pain at 2 years than at baseline. The amount of change from baseline in pain while at rest, during normal activities, and during work or exercise did not differ between the intention-to-treat groups. The reduction in perception of pain unpleasantness was significantly greater for patients receiving surgical repair than for those receiving watchful waiting (surgical repair, -6.2 mm vs watchful

waiting, -2.3 mm; difference, 3.9 mm; 95% confidence interval, 0.8 to 7.0 mm; $P = .01$). As-treated analyses yielded similar results.

At the time of crossover from watchful waiting to surgical repair, large increases since the last visit in pain unpleasantness and pain during normal

Table 2. Baseline Health Status Characteristics

Characteristic	Tension-Free Repair (n = 356)	Watchful Waiting (n = 364)	P Value
BMI, mean (SD)*	26.6 (3.8)	25.8 (3.4)	.004
Coexisting conditions, No. (%)			
CHF	2 (0.6)	1 (0.3)	.62
Prior MI	1 (0.3)	1 (0.3)	.99
Hypertension	95 (26.8)	102 (28.0)	.74
COPD	5 (1.4)	2 (0.5)	.28
Chronic cough	11 (3.1)	15 (4.1)	.55
Prostatism	35 (9.9)	42 (11.5)	.47
Diabetes	17 (4.8)	16 (4.4)	.86
Cigarette smoker	67 (18.9)	65 (17.9)	.77
Alcohol consumption >2 drinks/d	38 (10.7)	48 (13.2)	.30
ASA health status class			
1	227 (63.9)	246 (67.6)	.43
2	113 (31.8)	100 (27.5)	
3	15 (4.2)	18 (4.9)	
Surgical Pain Scale score, mean (SD)†			
At rest	8.2 (13.1)	8.2 (15.6)	.99
Normal activities	10.3 (14.9)	10.4 (14.9)	.93
Work/exercise	17.1 (24.6)	14.6 (20.7)	.20
Pain unpleasantness	12.9 (19.5)	10.9 (17.9)	.15
PCS score, mean (SD)‡	52.2 (7.9)	51.5 (7.7)	.29
AAS score, mean (SD)			
Sedentary	94.3 (9.6)	95.7 (8.0)	.03
Ambulatory	95.5 (9.8)	97.1 (8.0)	.02
Work/exercise	92.1 (12.8)	93.3 (11.9)	.28
Total	95.2 (8.4)	96.5 (6.7)	.04
Hernia characteristics, No. (%)			
Unilateral	308 (86.5)	311 (85.4)	.75
Bilateral	48 (13.5)	53 (14.6)	
Primary	322 (90.4)	321 (88.2)	.34
Recurrent	34 (9.6)	43 (11.8)	
Duration of hernia, No. (%)			
<6 wk	56 (15.8)	55 (15.1)	.73
≥6 wk	256 (71.8)	267 (73.4)	
Do not know	44 (12.4)	42 (11.5)	
Hernia enlarged in past 6 weeks, No. (%)	34 (9.6)	56 (15.4)	.04
Hernia reducibility, No. (%)			
Spontaneously	232 (65.1)	235 (64.5)	.17
Easily	108 (30.4)	120 (33.1)	
With difficulty	15 (4.2)	6 (1.7)	
Not reducible	1 (0.3)	3 (0.8)	
Hernia findings, No. (%)			
Palpable on impulse	151 (42.5)	142 (39.1)	.57
Visible when standing	184 (51.6)	202 (55.4)	
Extends into scrotum	21 (5.9)	20 (5.6)	

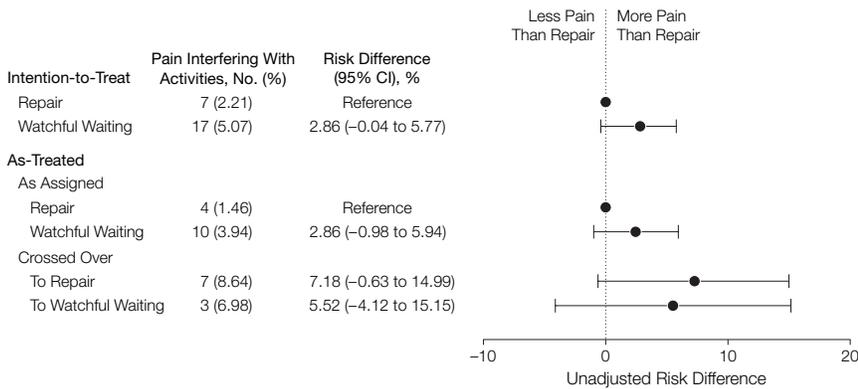
Abbreviations: AAS, Activities Assessment Scale; ASA, American Society of Anesthesiologists; BMI, body mass index; CHF, congestive heart failure; COPD, chronic obstructive pulmonary disease; MI, prior myocardial infarction; PCS, physical component summary.

*Calculated as weight in kilograms divided by the square of height in meters.

†Comprises four 150-mm visual analog pain scales.

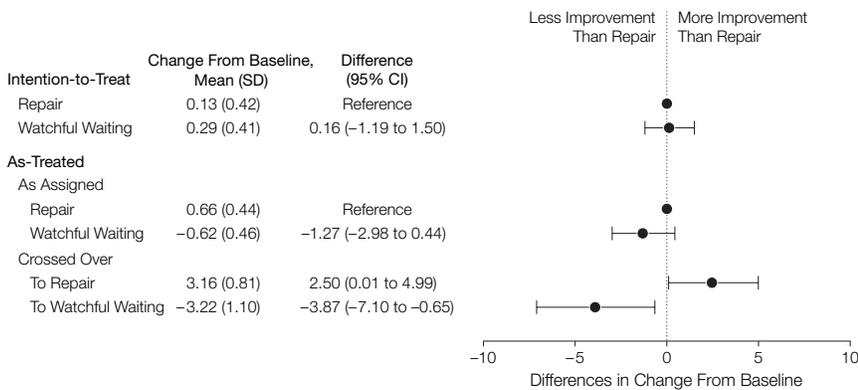
‡Scores range from 0-100, with a norm mean of 50.

Figure 2. Pain Interfering With Activities: Group Differences at 2 Years



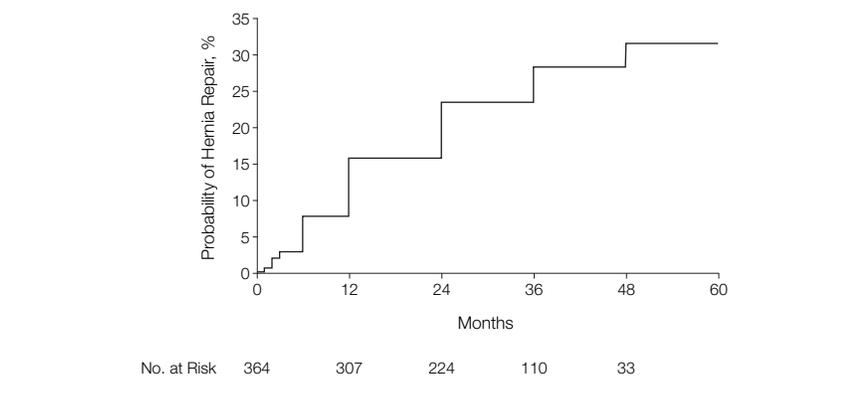
Reference group for intention-to-treat is tension-free repair (score=0); reference group for as-treated is patients randomized to and received tension-free repair (score=0).

Figure 3. Physical Component Score: Group Differences in 2-Year Change From Baseline



Reference group for intention-to-treat is tension-free repair (score=0); reference group for as-treated is patients randomized to and received tension-free repair (score=0).

Figure 4. Probability of Crossover From Watchful Waiting to Surgery



activities were noted in only 44% of the crossover group (n=29).

Patients also reported on their ability to perform a spectrum of everyday activities. In all categories of activities, intent-to-treat analyses indicated that patients receiving surgical repair showed significantly greater improvement than did watchful-waiting patients.

More than 97% of patients in both treatment groups were satisfied or very satisfied with the care they received.

Outcomes at Last Follow-up

The mean (SD) time to crossover was 27.2 (13.7) months (median, 24.4 months); beyond 2 years, the crossover rate was 4% per year (FIGURE 4).

Of the 379 patients who underwent hernia repair, 20 were lost to follow-up or withdrew consent and 5 died. Of the 354 remaining patients, 1.4% had a recurrence (n=5), with a rate of 0.0045 recurrences per patient-year.

All randomly assigned patients were considered at risk for acute incarceration without strangulation until herniorrhaphy was performed. Acute hernia incarceration occurred in 1 patient (0.3%) within 2 years of assignment to watchful waiting, and 1 acute hernia incarceration with bowel obstruction occurred at 4 years in a watchful-waiting patient; this was reduced with sedation and repaired electively. The hernia accident rate was 0.0018 events per patient-year.

COMMENT

Watchful waiting is a reasonable option for men whose inguinal hernia is minimally symptomatic. Two years after randomization, similar proportions of patients in the watchful-waiting and surgical repair groups had pain sufficient to limit usual activities, and their levels of physical functioning were similar. Patients assigned to watchful waiting who requested surgical repair most commonly reported increased pain as the reason for the crossover, and nearly half reported that pain interfered with normal activities. These symptoms improved for most patients after hernia repair.

Hernia accidents were extremely uncommon (rate of 1.8 per 1000 patient-years). Others have suggested that hernia accidents are more common in elderly patients, many of whom are unaware of their diagnosis and have not sought surgical care.^{5,18} In a review of the VA database (W. Henderson, PhD, National Surgical Quality Improvement Program, written communication, 2005), the mean age of patients having hernia emergencies was 77 years, and the rate of death after repair was found to be only 2.2%. The low accident rate of 1.8 per 1000 patients per year found in this strategy, the low mortality rate associated with surgical repair, and the similar pain and health outcomes identified at 2 years suggest that deferring surgery for men without troublesome symptoms is a reasonable option.

By 2 years, 23% of our watchful-waiting patients crossed over to receive surgical repair. We had anticipated that progression of symptoms in some men assigned to watchful waiting would lead them to request repair. Unexpectedly, nearly the same proportion of men assigned to receive repair (17%) did not have the operation, despite being well informed that participation in this study would give them a 50% chance of being directed to an operative intervention. Crossovers from watchful waiting to surgical repair continued to the close of the study, reaching 31% at 4 years.

We explored some of the differences in characteristics and outcomes between the as-treated groups. It appeared that certain baseline characteristics of patients assigned to watchful waiting who requested surgical repair differed from those of the other groups. At baseline, these patients reported high levels of sensory and affective pain during their normal activities (as measured by the hernia-specific Surgical Pain Scale¹¹) and had impaired physical function (as measured by the PCS of the Short Form-36 Version 2). Prostatism was also common. The men assigned to surgical repair who did not undergo repair may have been less

healthy than patients in other groups, as indicated by a somewhat higher American Society of Anesthesiologists classification and greater frequency of diabetes and hypertension. This crossover group also had worse physical functioning at baseline, but after repair they experienced considerably greater improvement in physical functioning than did the patients who received surgical repair as assigned. It may be useful to consider these characteristics when recommending a therapeutic strategy for men with few hernia-related symptoms. These differences may be the result of unique characteristics of these patients or of therapeutic intervention. Results from as-treated analyses, however, must be interpreted with caution. The validity of intention-to-treat analyses is based on randomization of subjects into the treatment groups, helping to ensure that the groups are comparable and the differences found between them after an intervention are real.¹⁹

Minimally symptomatic men who choose to defer surgical repair also defer the small risk of adverse consequences of a tension-free repair. Adverse consequences of surgical repair were identified in some patients, including short-term complications in 32.7%; longer-term problems, including chronic pain sufficient to limit activities in 1.7% at 3 years and 1.3% at 4 years for the subset of the group available for analysis at these points; and recurrence of the hernia in 1.4%.

This study has several limitations. The mix of patients evaluated (predominantly white, privately insured) may not resemble those found in other settings. Progression of hernia-related symptoms is time-dependent and the main outcomes of the study were assessed at 2 years. For all patients, the median length of follow-up was only 3.2 years. Because the risk of a hernia accident increases with the length of time the hernia is present and because accidents are more common in elderly individuals, a longer follow-up period may be needed to ascertain the longer-term risks of either treatment strat-

egy.¹⁸ To this end, we have established a voluntary long-term registry of patients enrolled in this and its companion trial comparing open and laparoscopic hernia repair² to annually assess patient-reported outcomes and the occurrence of hernia accidents and recurrences.

CONCLUSIONS

A strategy of watchful waiting is a safe and acceptable option for men with asymptomatic or minimally symptomatic inguinal hernias. Acute hernia incarcerations occur rarely, and patients who develop symptoms have no greater risk of operative complications than those undergoing prophylactic hernia repair.

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Author Contributions: Dr Jonasson had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Study supervision: Fitzgibbons, Gibbs, Neumayer, Barkun, Hoehn, Murphy, Sarosi, Syme, Thompson, Jonasson.

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of mesh plug used in plug and patch surgical repair of hernia and is a consultant for TyRx Pharma Inc, developers of an antibiotic- and local anesthetic-impregnated mesh for tension-free repair of hernia. No other authors reported disclosures.

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