The American Journal of Surgery (2017) 213, 58-63

The American Journal of Surgery®

Clinical Science

Open repair of incisional ventral abdominal hernias with mesh leads to long-term improvement in pain interference as measured by patient-reported outcomes

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KEYWORDS:
Hernia;
Incisional;
Mesh;
Patient-reported outcomes;
Survey;
Pain

Abstract

BACKGROUND: The Patient-Reported Outcomes Measurement Information System was used to evaluate the effects of open incisional ventral hernia repair on hernia-related pain.

METHODS: All patients who underwent elective repair of a primary or recurrent midline incisional hernia over a 3-year period completed Patient-Reported Outcomes Measurement Information System pain surveys and rated their pain intensity on a visual analogue scale. A retrospective review of these patients was performed.

RESULTS: Seventy-seven patients underwent midline incisional ventral hernia repair and completed preoperative and postoperative surveys. Thirty-eight patients completed surveys at least 6 months after surgery. These patients demonstrated significant improvement in pain interference postoperatively ($P < .05$) but not in pain behavior. Patients with higher pain intensity scores preoperatively had greater improvements in pain behavior and pain interference postoperatively.

CONCLUSIONS: Patients with incisional ventral hernias have improvement in pain interference 6 months after open surgical repair. Changes are most pronounced in patients who experience higher magnitudes of pain preoperatively.

Approximately, 350,000 ventral hernia repairs are performed annually in the United States[1] and up to 57% of those patients report pain before repair of the hernia.[2] Indications for operative intervention for a ventral hernia include risk of incarceration or bowel strangulation, cosmesis, and pain.[3–5] With pain driving many of these repairs, it is important to evaluate in a standardized fashion whether ventral hernia repair can improve pain by using patient-reported outcomes (PROs).

The Patient-Reported Outcomes Measurement Information System (PROMIS) is a rigorous and reliable tool created by the National Institutes of Health Roadmap for Medical Research Initiative to measure patient feedback in clinical research and health care delivery settings. PROMIS is composed of multiple accessible item banks created to

This study was funded by internal funding.
The authors declare no conflicts of interest.
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Manuscript received March 9, 2016; revised manuscript May 23, 2016

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http://dx.doi.org/10.1016/j.amjsurg.2016.05.011

measure key symptoms and health concepts categorized under 5 domains of health-related quality of life, including pain.[6–8] The pain interference and pain behavior domains of PROMIS assess how pain impacts a patient's behavior and social functioning and compare this to normative data based on the United States population. The goal of our study was to assess preoperative and postoperative pain-related behavior and interference in patients undergoing open incisional ventral hernia repair using PROMIS. We hypothesize that pain-related patient-reported outcomes improves in these patients when assessed after 6 months of follow-up postoperatively.

Methods

All patients who underwent elective repair of a primary or recurrent midline incisional hernia with the senior author (G.A.D.) from August 2010 to April 2013 were asked to complete the PROMIS Pain Interference and Pain Behavior item banks delivered in the computerized adaptive testing (CAT) format.[9,10] Patient participation was voluntary, and no additional exclusion criteria in patient selection were applied. Patients completed the surveys on an iPad (Apple Inc., Cupertino, CA) during their preoperative clinic visit, and at every subsequent postoperative visit. Patients were also asked to rate their hernia or surgery-related pain on an 11-point comparative pain scale (0 to 10) during each survey to provide a legacy control. The patients completed the questionnaire voluntarily and without the presence of the surgeon or clinical staff to prevent outcome bias.[11] Completion of the questionnaire took approximately 3 to 5 minutes per patient, per visit. All patients who completed preoperative and postoperative questionnaires were included in this study.

A retrospective review of patient charts was performed to record patient demographics and comorbidities. Statistical analysis of PROMIS t-score and 11-point comparative pain scale score change was performed using the Wilcoxon signed-rank test. Comparisons of patient characteristics were performed using the Student *t* test and chi-square test, as appropriate. Bonferoni corrections were not used. All analyses were performed using SPSS Statistics 20 (IBM, Armonk, NY). Approval from the institutional review board of Northwestern University was obtained before initiation of the study.

Results

A total of 77 patients underwent ventral hernia repair with the senior author and completed both preoperative and postoperative PROMIS questionnaires and the 11-point comparative pain scale between August 2010 and April 2013. The mean age of this population was 54 years, and 45.3% were female. A summary of patient demographics, comorbid factors, operative features, and preoperative questionnaire results is listed in Table 1.

Table 1 Preoperative data (N = 77)

Patient characteristics	Mean ± SD
Age (y)	54.3 ± 12.8
Body mass index (kg/m^2)	31.54 ± 7.1
Female sex, n (%)	39 (45.3)
Comorbid factors	**n (%)**
Diabetes	9 (11.7)
Hypertension	37 (48.1)
Smoking	18 (23.4)
Steroids/immunosuppression	11 (14.3)
Operative details	
Primary incisional hernia	50 (64.9)
Recurrent incisional hernia	27 (35.1)
Separation of parts	46 (59.7)
Bioprosthetic mesh	3 (3.9)
Polypropylene mesh	66 (85.7)
PTFE mesh	7 (9.1)
Contamination	7 (9.1)
Concurrent bowel work	12 (15.6)
No. prior abd surgeries, mean ± SD	2.1 ± 1.3
Questionnaire data	**Mean ± SD**
Preop pain intensity	4.4 ± 2.9
Preop pain interference, t-score	53.8 ± 11.0
Preop pain behavior, t-score	51.1 ± 11.4

SD = standard deviation.

Of all, 64.9% of the patients underwent primary incisional hernia repair, and 35.1% underwent recurrent hernia repair. Of all, 59.7% of the patients underwent separation of components during their hernia repair; 86% of the patients received polypropylene mesh, 10% received condensed polytetrafluoroethylene mesh (Motifmesh, Proxy Biomedical, Cleveland, OH), and 4% received bioprosthetic mesh. Of all, 15.6% of the patients had concurrent bowel work during their hernia repair (Table 1). Mesh in all cases was placed in a standardized fashion. A narrow mesh 7.5 cm in width was placed in either the intraabdominal position (57 patients) or the retro-rectus space (19 patients). 0-prolene sutures were placed 4 cm from the medial aspect of the rectus muscles and used to "quilt" the mesh to the undersurface of the abdominal wall. The medial aspect of the rectus muscles was closed over the mesh to achieve a direct supported repair.

The median length of follow-up after surgery was 6.03 months (range .4 to 26.4 months). Median follow-up in the 38 patients who completed at least 6 months of follow-up was 11.7 months (range 6.03 to 26.4 months). The most commonly encountered postoperative complication was cellulitis/wound infection (10.4%), followed by delayed wound healing (5.2%), hematoma formation (2.6%), and seroma formation (3.9%). Of all, 2.6% of the patients experienced recurrence of their hernia during the documented follow-up period (Table 2).

The average preoperative pain intensity score, pain interference t-score, and pain behavior t-score of all