Surgery ■■ (2017) ■■–■■

Contents lists available at ScienceDirect

Surgery

journal homepage: www.elsevier.com/locate/ymsy

Central Surgical Association

Preoperative pain in patient with an inguinal hernia predicts long-term quality of life

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ARTICLE INFO

Article history:
Accepted 29 September 2017

ABSTRACT

Background. Patients presenting for inguinal hernia repair report a wide range of pain. We hypothesized that patients presenting with less preoperative pain would experience a greater improvement in long-term quality of life after an inguinal hernia repair.

Methods. A total of 54 patients underwent either laparoscopic or open inguinal hernia repair and completed the Short Form 12 (SF-12) survey both preoperatively and 6 to 12 months after their repair. The physical and mental component scores (PCS and MCS) were calculated from the SF-12. Patients also completed an analog surgical pain scale. *t* Tests and analyses of covariance were used. A preoperative surgical pain scale score of >12 was representative of moderate to severe pain.

Results. Regardless of preoperative pain, there was improvement in long-term PCS quality of life (45.4 ± 11.3 vs 50.1 ± 9.1; $P < .0001$) that was not noted when assessing MCS quality of life (55.0 ± 8.3 vs 54.7 ± 9.4; $P = .76$). Patients who reported no or a low amount of preoperative pain experienced improved PCS quality of life compared with patients who reported moderate to severe preoperative pain ($P = .048$). This relationship was not noted with MCS ($P = .16$).

Conclusion. This study suggests that patients presenting for inguinal hernia repair with no or low pain are more likely to experience improved physical function quality of life as a result of the herniorrhaphy.

Inguinal hernias are among the most common surgical problems in the world, with a lifetime risk of 27% in men and 3% in women.[1] Given the prevalence of inguinal hernias, it is important that surgeons choose an appropriate surgical method for repair that results in the greatest quality of life (QOL). Until the 1990s, the only surgical option was an open approach for all inguinal hernia repairs. At that time, the laparoscopic technique emerged, providing surgeons with a new alternative to inguinal hernia repair.[2] The use of laparoscopic repair has increased substantially from 6% in 1992 to 41% in 2008.[3] Previous studies have argued that laparoscopic inguinal repairs result in faster postoperative recovery when compared with an open approach, yet these studies have not evaluated the long-term QOL in patients.[4,5]

Metrics of QOL are being used increasingly to measure operative outcomes because QOL is cited as a primary reason patients seek repair of their hernia.[6] Recent studies have argued that pain in the preoperative and immediate postoperative period are strong risk predictors for chronic groin pain in both the open and laparoscopic approach.[7,8] The primary objective of this study was to determine the impact of preoperative pain on long-term QOL in patients who underwent open and laparoscopic inguinal hernia repair.

Methods

After approval by the Institutional Review Board of the Medical College of Wisconsin (Milwaukee, WI), data for adult patients aged ≥18 years who underwent inguinal hernia repair at Froedtert and the Medical College of Wisconsin between September 2012 and July 2016 were analyzed retrospectively from a prospectively maintained department database; 468 inguinal hernia repairs were identified, performed by 4 general surgeons trained in minimally invasive techniques of inguinal herniorrhaphy. Patients were asked to complete a preoperative Short Form 12 (SF-12) survey and an analog surgical pain scale (SPS).[9] In addition to baseline surveys, patients were mailed SF-12 and SPS forms at 6-month intervals. Because the majority of patients failed to complete both the 6- and 12-month surveys, patients were included in the study if they completed the preoperative SF-12 and SPS forms and either a 6- or 12-month follow-up set of surveys. Of the 468 eligible patients, only 54 completed all the forms necessary to be included in the study. Fifty-one of the 54 patients were male and 3 were female.

Presented at the 2017 Annual Meeting of the Central Surgical Association, Chicago, IL.

This research was funded by the Department of Surgery, Medical College of Wisconsin.

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https://doi.org/10.1016/j.surg.2017.09.055
0039-6060/

Laparoscopic and open inguinal hernia repair

The laparoscopic hernia repairs were performed preferentially with a totally extraperitoneal approach. A balloon dissector was used to create the preperitoneal space (Medtronic, Inc, Minneapolis, MN). The type of mesh used was left to the discretion of the surgeons but ranged from anatomically shaped, self-fixating polyester mesh (Medtronic) to polypropylene mesh (Ethicon Endo-Surgery, Inc, Cincinnati, OH) with absorbable tack fixation (Medtronic). Open repairs were done with mesh placed in a Lichtenstein fashion. The type of mesh used was either a self-fixating polyester mesh (Medtronic) or a polypropylene mesh (Ethicon). Regardless of type of mesh used, it was secured using permanent suture along the iliopubic tract. For the self-fixating mesh, no additional sutures were placed superiorly into the transversalis fascia. All repairs were done as either outpatient procedures or with 23-hour observation if patient comorbidities warranted.

Survey information

All patients were administered the SF-12 and visual analog SPS surveys at standard intervals, beginning at their initial consult with the surgeon and via mail at 6-month and 12-month intervals. The SF-12 is a validated, 12-question survey used to assess physical and mental QOL.[8] For the purposes of this study, physical and mental composite scores (PCS and MCS) scores were calculated pre- and postoperatively through 12 months for all patients who completed surveys. If a patient returned both the 6- and 12-month SF-12 surveys, only the 12-month survey was analyzed. Analog SPS scores (0–147 mm) were calculated preoperatively based on the score patients reported regarding their average amount of pain at rest during their preoperative consult with the surgeon.

Calculating scores

MCS and PCS were calculated using a scoring algorithm developed for the Social Security Administration in the Mental Health Treatment Study prepared by Westat, a professional services corporation that provides research services to agencies of the US government.[10] The patient responses to the SF-12 questions were coded numerically based on the response provided for each item. Scale scores were created by adding 2 of the following items for subcategories: Physical Functioning, Role Physical, Role Emotionally, and Mental Health. Additional scale scores only required the score of 1 item for subcategories: Bodily Pain, General Health, Vitality, and Social Functioning. The scale scores were transformed, standardized, and aggregated in MCS and PCS. The MCS and PCS were transformed by setting the mean to 50 with a standard deviation of 10. Scores >50 represent a greater QOL and <50 represent a lesser QOL. Thus, a score of 60 would be representative of a patient who has a QOL in the top 84th percentile of the normal population distribution.

SPS scores of 0 to 12 were considered as no or low pain, and scores of 13–147 were considered moderate to severe pain. These values were chosen because of a natural clustering of pain scores at <12 and >12. These numbers tended to correlate with patients' subjective description of their pain on the initial visit. A single, trained individual measured all SPS scores by hand with the same ruler.[11] The no/low and moderate/severe pain cohorts consisted of 30 and 24 patients, respectively. The SPS scores of 0 to 12 and 13 to 147 were compared with the MCS and PCS to measure differences in postoperative PCS and MCS between patients presenting with no/low and moderate/severe preoperative pain.

Table 1
Baseline demographic data for both the no/low pain and moderate/severe pain groups.

	No/low pain n = 30	Moderate/ high pain n = 24	*P* value
Age	63.3 ± 15.0	58.5 ± 18.1	.30
Sex (male)	28 (93%)	23 (96%)	.69
BMI	25.6 ± 3.4	25.6 ± 4.5	.98
Hypertension	15 (50%)	8 (33%)	.22
Type 2 diabetes mellitus	2 (7%)	2 (8%)	.82
Procedure type (laparoscopic)	18 (60%)	17 (71%)	.41
Bilateral hernias	11 (37%)	8 (33%)	.80
Operative time	86.1 ± 38.3	86.8 ± 55.4	.96

BMI, body mass index.

Statistical analysis

All statistical analyses were conducted using SPSS Version 21 (IBM Corp., Armonk, NY). χ^2 Tests were used for categorical variables. *t* Tests and analyses of covariance were conducted to determine variations in physical and mental QOL over time, as well as to assess whether preoperative pain at rest affected the long-term physical and mental QOL of the patient. Mann-Whitney *U* tests were used when data were nonparametric. Change scores were calculated by taking patients' PCS and MCS scores at 6 to 12 months and subtracting their baseline score. All analyses were 2-sided.

Results

The no/low pain and moderate/severe pain groups were evaluated for baseline demographic data and were found to be similar. (Table 1). There was no difference in the change of PCS between open (5.6 ± 8.3) and laparoscopic (3.4 ± 7.1, $P = .33$) approaches or in the change of MCS between open (–0.2 ± 5.9) and laparoscopic (–0.1 ± 6.6, $P = .93$) approaches. Additionally, when controlling for baseline resting pain and QOL, there was no difference in PCS or MCS scores based on the type of operative approach (PCS $P = .60$; MCS, $P = .93$). All patients, regardless of preoperative SPS pain score, had a slight improvement in the PCS QOL when comparing baseline to 6- or 12-month scores (45.6 ± 11.4 vs 49.8 ± 9.3; $P < .0001$). This improvement over baseline was not noted when assessing long-term MCS QOL after inguinal hernia repair (54.9 ± 8.5 vs 54.7 ± 9.1; $P = .89$).

The results were then stratified based on preoperative SPS scores. There was no difference in the preoperative PCS and MCS when comparing the no/low pain groups with the moderate/high pain groups. Six to 12 months after inguinal hernia repair, both the no/low pain and the moderate/high pain groups had slight improvement in PCS scores compared with baseline (47.7 ± 10.9 vs 52.2 ± 7.2, $P = .009$ and 43.1 ± 11.6 vs 46.9 ± 10.9, $P = .003$, respectively); however, the moderate/high pain group had a much greater postoperative PCS score than the no/low pain group (52.2 ± 7.2 vs 46.9 ± 10.9, $P = .04$) (Table 2). There was no difference in the MCS scores after operation regardless of preoperative pain group (Table 3). There was a significant difference in the baseline SPS score between the no/low pain group and the moderate/high pain group (Table 2). The no/

Table 2
Analog surgical pain scale scores as measured on a continuous scale from 0 to 147 mm.

	No/low pain n = 30	Moderate/high pain n = 24	*P* value
Baseline	4.8 ± 4.3	41.0 ± 29.9	<.001
6–12 mo postoperative	8.2 ± 13.6	12.4 ± 24.5	.43
P value	.22	.004	

Patients were divided into 2 groups based on their preoperative SPS scores as either no/low pain or moderate/high pain. Postoperative SPS scores measured at either 6 or 12 mo are shown.

Please cite this article in press as: Neil Mier, Melissa Helm, Andrew S. Kastenmeier, Jon C. Gould, and Matthew I. Goldblatt, Preoperative pain in patient with an inguinal hernia predicts long-term quality of life, Surgery (2017), doi: 10.1016/j.surg.2017.09.055