Diseases of the Colon & Rectum

Original Contributions

Quality of Life and Chronic Pain Four Years After Gastrointestinal Surgery

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PURPOSE: Little is known about the prevalence of chronic postsurgical pain after gastrointestinal surgery. This study was designed to assess the prevalence of chronic pain and quality of life in a cohort of patients who underwent surgery for benign and malignant gastrointestinal disease. METHODS: A prospective cohort design was used to assess quality of life and morbidity at four years postoperatively in 435 patients who had upper, hepatopancreaticobiliary, small-bowel, and/or colorectal anastomotic surgery in 1999 at one regional center in Northeast Scotland. Chronic pain and quality of life were assessed by postal survey using the European Organization for Research and Treatment of Cancer Quality of Life-C30 questionnaire and McGill Pain Questionnaire. RESULTS: Of the 435 patients recruited in 1999, 135 (31 percent) had died by censor date in 2003. There was a 74 percent (n = 202) response rate from surviving patients eligible for follow-up. Prevalence of chronic pain at four years postoperatively was 18 percent (95 percent confidence interval, 13–23 percent). Pain was predominantly neuropathic in character; a subgroup reported moderate-to-severe pain. Risk factors for chronic postsurgical pain included female gender, younger age, and surgery for benign disease. Compared with those who were pain-free at follow-up, patients with chronic pain had poorer functioning, poorer global quality of life, and more severe symptoms, independent of age, gender, and cancer status. CONCLUSIONS: The prevalence of chronic pain after laparotomy for gastrointestinal malignancy and nonmalignant conditions at four years after surgery was 18 percent. These patients had significantly poorer quality of life scores independent of age, gender, and cancer status. [Key words: Chronic pain; Postoperative complications; Quality of life; Gastrointestinal surgery]

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Improvements in survival after gastrointestinal (GI) surgery, particularly for malignant disease, during recent decades and increased patient expectation emphasize the need to consider other health-related postoperative outcomes, such as morbidity and quality of life (QOL) measures. Health-related QOL is known to be lower in certain subgroups of surgical patients, including those undergoing surgery for esophageal,[1] recurrent rectal,[2] and colorectal cancer.[3] Of studies that include longitudinal assessment, many report that postoperative QOL improves with time, often with restoration to baseline preoperative values within one year of surgery.[1,3] Chronic pain is a late adverse sequel of surgery with postoperative prevalence of up to 40 percent reported after inguinal hernia surgery and cardiac surgery, depending on timing and method of pain assessment.[4,5] One large survey of patients (>5,000) attending specialist chronic pain clinics in the United Kingdom revealed that more than one-quarter of patients implicated surgery as the cause of their pain.[6] Chronic postsurgical pain (CPSP) is a syndrome recognized by the International Association for the Study of Pain (IASP).

To date, no studies have assessed the prevalence of CPSP after laparotomy for benign and malignant conditions, nor evaluated the relationship between QOL and chronic pain. This study was designed to

assess the prevalence of chronic pain and QOL at four years postoperatively in a cohort of patients in Northeast Scotland who underwent anastomotic surgery in 1999 for benign and malignant gastrointestinal disease.

METHODS

A prospective design was used to assess outcome in a cohort of patients four years after GI anastomosis surgery. All consecutive patients undergoing upper GI, hepatopancreaticobiliary (HPB), small-bowel, and/or colorectal anastomoses conducted by 23 consultant surgeons at one major regional center (Aberdeen Royal Infirmary) in Northeast Scotland were recruited between January 1, 1999 and December 31, 1999.

Baseline surgical data included type and location of surgery, grade of operator, American Society of Anesthesia (ASA) grade (1–5), and anastomotic closure (stapled/sutured). Reason for surgery in 1999 was categorized as GI cancer, cancer at other site, or no cancer (including bowel obstruction, polyps, diverticulitis, etc.) based on pathology reports and whether there was a record of cancer before their operation in 1999. Diagnosis of anastomotic leak was based on clinical diagnosis supplemented by radiologic or other confirmation where necessary, irrespective of whether reoperation or any other intervention was required. Data on incidence of anastomotic leak within 30 days of GI surgery have been reported.[7] A surgical audit coordinator, independent of surgical personnel, was responsible for baseline surgical data collection (MT).

Ethical Permission

Study approval for the follow-up study in 2003 was obtained from the Grampian Research Ethics Committee, from 23 consultant surgeons responsible for surgery, and from the Grampian University Hospitals Trust Caldicott Guardian. Vital status, current address, and patient transfers out of Grampian were obtained by using the Patient Administration System and Community Health Index (CHI). Surviving patients who resided in the Grampian Region were eligible to receive a postal questionnaire. As a result of changes in the Data Protection Act 1998, an invitational cover letter from the Director of Public Health at Grampian Health Board was enclosed with each patient questionnaire and a study information sheet.

Questionnaire Design

The survey instrument was similar to that used in our previous studies of CPSP and QOL.[4,5] The questionnaire comprised sections on sociodemographic information, general health, and pain. Standard sociodemographic questions on marital status, education, housing, and employment status were taken from the 2001 census. Body mass index (BMI) was calculated from self-reported height and weight at time of survey (kg/m^2). Patients were asked whether they suffered any pain and whether their pain was related to their surgery in 1999. Chronic pain was defined as pain arising after surgery and "persisting either continuously or intermittently for longer than three months" as per the IASP definition. Those reporting chronic pain related to their surgery were asked to complete a detailed pain section; pain characteristics were assessed using the McGill Pain Questionnaire (MPQ), which categorizes selected terms as sensory, affective, or evaluative.[8] Patients were asked to complete body pain charts using different graphic symbols for numbness, pins and needles, burning, stabbing, and ache.[9]

Patient quality of life was assessed by using the European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 questionnaire, which has been validated for use in the general population and for those with cancer.[10,11] Permission for use was obtained from the EORTC QOL Group in Brussels, Belgium. The EORTC QLQ-C30 questionnaire is composed of five multi-item functional scales that evaluate physical, role, emotional, cognitive, social function, and one global health status/QOL scale. Three multi-item symptom scales measure fatigue, pain, nausea/vomiting, and six single items assess as dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial difficulties. The questionnaire is mostly designed to measure symptoms in the preceding week. A high score for the functional scale indicates a high level of functioning and QOL, whereas a high symptom score indicates more severe symptoms.

Statistical Analysis

Data were entered into Microsoft Access and analyzed using SPSS® for Windows version 12.0. $P < 0.05$ was considered statistically significant, and 95

percent confidence intervals (CI) were calculated. For categoric variables, the chi-squared test or Fischer's exact test was used. Odds ratios with confidence intervals were calculated for known and potential risk factors for chronic pain and poor QOL, including age, gender, BMI, and cancer status. Cancer status was categorized as any malignancy at time of surgery or none. Nature of pain was classified as neuropathic or nonneuropathic based on selected symbols: numbness, pins and needles, burning, stabbing (neuropathic), and ache (nonneuropathic).[9] The MPQ was analyzed by using three methods as described by McDowell and Newell[12]: the Pain Rating Index using scale weight values (PRI); the Pain Rating Index using scale weighted-rank values (PRI-R); and number of words chosen (NWC). A standard syntax program was used to analyze the EORTC and guidelines for missing values were used.[10] Multiple regression was used to compare EORTC domains across pain groups; analysis was adjusted for factors identified in the univariate analysis.

RESULTS

Patient and surgical characteristics of the cohort recruited in 1999 are summarized and the results from the follow-up study in 2003 are presented.

Cohort Characteristics at Surgery

A total of 435 patients underwent 449 gastrointestinal procedures with 515 anastomoses. Of these patients, 213 were male (49 percent) and the mean age was 60.9 (standard deviation (SD), 18.9) years; mean age of males and females were similar (P = 0.38). Patient and surgical characteristics are displayed in Table 1. Patients with higher ASA Grade (3, 4, or 5) were more likely to be older than patients with ASA Grade 1 or 2 (Kruskal-Wallis test, $P < 0.001$). The majority of operations performed were elective procedures (n = 316, 70 percent) and consultant surgeons performed 281 of 449 procedures (63 percent), with higher and basic surgical trainees performing 151 (34 percent) and 13 (3 percent) procedures, respectively. Approximately one-half of the cohort had gastrointestinal cancer at time of surgery, and 15 patients had cancer at other sites (bladder, n = 10; prostate, n = 3; and ovary, n = 2).

Sample Tracing and Response Rate

Of 435 patients recruited to the study in 1999, 135 patients (31 percent) had died by censor date (July 1, 2003) and 27 (6 percent) had transferred out of

Table 1.
Characteristics of Patients at Surgery and in Surviving Respondents at Four Years Postoperatively

Characteristic	At Surgery (n = 435)	Surviving Respondents (n = 202)
Male/female ratio	213 (49)/222 (51)	88 (44)/114 (56)
Age at surgery (yr)		
<40	62 (14)	31 (15)
40–60	103 (24)	53 (26)
61–80	230 (53)	108 (54)
>80	40 (9)	10 (5)
ASA grade at surgery		
1	67 (15)	33 (16)
2	210 (48)	114 (56)
3	133 (31)	52 (26)
4	25 (6)	3 (2)
Site of surgery[a]		
Upper	58 (13)	14 (7)
Hepatopancreaticobiliary	21 (5)	10 (5)
Small bowel	226 (52)	98 (49)
Colorectal	159 (37)	91 (45)
Cancer status at surgery		
Gastrointestinal cancer	228 (52)	100 (50)
Cancer at other site	15 (3)	7 (4)
None	173 (40)	88 (44)
Missing	19 (4)	7 (4)

ASA = American Society of Anesthesiologists.
Data are numbers with percentages in parentheses.
[a]Site of surgery analyzed as yes/no to account for multiple procedures within same operation.

Table 2.
Chronic Pain Characteristics

Chronic Pain Characteristic	n = 36
Pain onset	
Immediately	12 (33)
Within 1 month	7 (19)
Between 1 and 3 months	6 (16)
>3 months	8 (22)
Missing	3 (8)
Severity of pain	
Mild	5 (13)
Moderate	13 (36)
Severe/unbearable	16 (44)
Missing	2 (6)
How often does pain occur?	
Continuously/several times per day	16 (44)
Several times weekly	7 (19)
Several times month	7 (19)
Less than monthly	4 (11)
Missing	2 (5)
Pain classification	
Neuropathic only	17 (47)
Nonneuropathic only	6 (17)
Combination	10 (28)
Missing	3 (8)

Data are numbers with percentages in parentheses.

Grampian Region. A total of 275 survivors were eligible for follow-up in 2003. Of 275 questionnaires sent, 233 (85 percent) were returned after one reminder. Of these, 202 were fully completed, 15 were blank, 4 were undeliverable/incorrect address, and 10 patients or relatives/caregivers stated a reason for nonparticipation (*e.g.,* patient in a nursing home, dementia, medico-legal reasons). Thus, the final sample comprised 202 patients, 74 percent of those eligible for follow-up. The mean time to follow-up survey was 4.3 (SD, 0.3) years. Using age at surgery in 1999, the 42 nonresponders were significantly younger than responders (48 *vs.* 58.8 years; $P = 0.004$).

Characteristics of Surviving Respondents

Table 1 displays patient and operative characteristics for surviving patients; mean age of males and females was similar (64.5 *vs.* 61.9 years; $P = 0.31$). Distributions of ASA grade, age at surgery, and cancer status were similar in the baseline cohort and those patients followed-up at four years. Mean BMI at follow-up was 25.6 kg/m^2 (SD, 4.9), with 50 percent of patients in the overweight or obese categories (BMI $\geq$ 25).

Prevalence of Chronic Postsurgical Pain

Forty patients (20 percent) reported chronic pain that lasted for more than three months postoperatively. Three patients failed to complete the detailed pain section and one patient described arthritic pain unrelated to surgery. The prevalence of chronic pain at or near the operative site was 18 percent (36/202; 95 percent CI, 13.3–23.1 percent). Of these 36 patients, 21 reported that they still suffered from pain at the time of survey in 2003. Location of pain drawn on body maps or cited in text was most commonly in the central abdomen or lower abdominal region (n = 33 patients; n = 3 missing). Table 2 presents pain characteristics and severity; 17 patients were categorized as having neuropathic pain and 10 having a combination of neuropathic and nonneuropathic pain (*e.g.*, persistent ache).

The mean number of MPQ descriptive terms selected to describe the pain was 6.7 (SD, 4.9) words (Table 3). Sensory-discriminative terms were most frequently selected, thus words describing pain experience using temporal, spatial, and pressure terminology, *e.g.,* stabbing, shooting, and throbbing. The most frequently selected descriptor was "stabbing" (21/36 patients).

Table 3.
McGill Pain Questionnaire Scores

	MPQ Subclass (n = 34 patients)				
	Sensory–Discriminative	Motivational–Affective	Cognitive–Evaluative	Miscellaneous	Total
Pain Rating Index-S	11.4 (7.2)	3.2 (4.4)	2.2 (1.7)	3.7 (3.4)	19.4 (15.1)
Pain Rating Index-R	11.4 (7.7)	3.3 (5.2)	2.3 (1.9)	3.2 (3.6)	19.1 (16.6)
No. of words chosen	4.2 (2.4)	1.1 (1.3)	0.7 (0.5)	1.3 (1.2)	6.7 (4.9)

MPQ = McGill Pain Questionnaire.
Data are means with standard deviations in parentheses.

Table 4.
Risk Factors for Chronic Postsurgical Pain

Risk Factor	Chronic Pain (n = 36)	No Chronic Pain (n = 166)	Unadjusted Odds Ratio (95% CI)	*P* Value
Age (yr)				
≤60	23 (27)	61 (73)	3.05	0.006
61+	13 (11)	105 (89)	(1.4, 6.5)	
Gender				
Female	27 (24)	87 (76)	2.72	
Male	9 (10)	79 (90)	(1.2, 6.1)	0.01
Body mass index				
Overweight/obese	17 (17)	84 (83)	0.77	0.5
Underweight/normal	16 (21)	61 (79)	(0.36, 1.65)	
Upper gastrointestinal procedure				
Yes	4 (29)	10 (71)	1.9	
No	32 (17)	156 (83)	(0.57, 6.6)	0.22
Hepatopancreaticobiliary procedure				
Yes	6 (60)	4 (40)	8.1	
No	30 (16)	162 (84)	(2.2, 30.4)	0.003
Small-bowel procedure				
Yes	21 (21)	77 (79)	1.62	
No	15 (14)	89 (86)	(0.78, 3.4)	0.19
Colorectal procedure				
Yes	11 (12)	81 (88)	0.46	
No	25 (23)	95 (77)	(0.21, 1)	0.05
Cancer status in 1999				
Any	11 (10)	96 (90)	0.32	0.004
None	23 (26)	65 (74)	(0.15, 0.71)	
ASA grade				
1 or 2	28 (19)	119 (81)	1.38	0.59
3, 4, or 5	8 (15)	47 (86)	(0.6, 3.3)	

CI = confidence interval; ASA = American Society of Anesthesiologists.
Data are numbers with percentages in parentheses unless otherwise indicated.

Risk Factors for Chronic Pain After Gastrointestinal Surgery

The risk factors for chronic pain are presented in Table 4. Younger patients, categorized as aged 60 years or younger, were three times more likely to report CPSP than patients older than 60 years. The proportion of patients with CPSP reduced from 32 percent of patients younger than aged 40 years to 25 percent of patients aged 40 to 60 years to 11 percent of patients older than aged 60 years (chi-squared test, $P = 0.01$). Females were at higher risk of developing CPSP after surgery. Surgical procedure by anatomic site (upper; HPB; lower) was analyzed categorically (yes/no) to account for patients undergoing multiple procedures within the same surgery. Although patients undergoing HPB surgery were at higher risk of developing chronic pain, patient numbers were low in this procedure category. Patients undergoing colorectal surgery were less likely to develop CPSP ($P = 0.05$). No association was found between BMI or ASA grade and development of CPSP. Patients diagnosed with gastrointestinal or other malignancy in 1999 were significantly less likely to report CPSP at four years postoperatively.

Quality of Life by Age, Gender, and Cancer Status

Mean (SD) EORTC scores were calculated for the 202 patients and first explored by gender, age, and cancer status. Females had lower mean scores than males, indicating poorer health, for five of six functioning scales, although only physical and emotional functioning was significantly poorer. Females had higher mean symptom scores than males, indicating poorer health, with fatigue, nausea, pain, and diarrhea symptom scores being significantly worse than those for males. Older patients, categorized as older than aged 60 years, had significantly poorer physical health and dyspnea (data not shown; *t*-test, $P < 0.05$). Younger patients had significantly worse scores for emotional health, diar-

Table 5.
EORTC Quality of Life Scores by Cancer Status

EORTC Domain	Cancer Any Site (n = 107)[a]	No Cancer (n = 88)	*P* Value[b]
Functional scales			
Physical	83.3	81.5	0.57
Role	85.9	76.6	0.03
Cognitive	85.7	84.3	0.63
Emotional	89.8	82.4	0.006
Social	86.9	71.5	<0.001
Global quality of life	74.3	65.7	0.02
Symptom scales			
Fatigue	19.1	32.2	0.001
Nausea	6	16.3	0.003
Pain	10.3	24.5	<0.001
Dyspnea	16	17.2	0.75
Insomnia	21.1	27.4	0.14
Appetite loss	7.9	16.9	0.009
Constipation	16.9	12.5	0.24
Diarrhea	11.7	25.5	0.002
Financial problems	5.7	12.3	0.05

EORTC = European Organization for Research and Treatment of Cancer.

Data are means with standard deviations in parentheses.

[a]Higher scores referring to functional scales indicate better functioning; higher symptom scores indicate more/severe symptoms.

[b]Independent samples *t*-test.

rhea, pain, and financial problems (data not shown; *t*-test, $P < 0.05$).

Patients who were cancer-free at time of surgery in 1999 had worse QOL at four years postoperatively compared with those diagnosed with cancer (Table 5). Patients with cancer had significantly higher role, emotional, social, and global QOL scores compared with those who were operated on for nonmalignant conditions. Patients who were cancer-free had significantly more fatigue, nausea, pain, appetite loss, diarrhea, and financial problems.

Scores for QOL were compared for patients with and without CPSP. Unadjusted scores for functioning and symptoms were consistently worse in patients reporting CPSP, except for one domain: constipation. Multiple linear regression analysis was undertaken to account for age, gender, and cancer status, with age entered in the model as a continuous variable (Table 6). Mean QOL functioning and symptom scores were significantly worse in patients with CPSP, for all domains except for constipation, after adjustment for age, gender, and cancer status.

DISCUSSION

This study investigated the prevalence of chronic pain after gastrointestinal anastomotic surgery for malignant and nonmalignant conditions. It was an opportunistic, posthoc assessment conceived to doc-

Table 6.
EORTC Quality of Life Scores for Patients With and Without Chronic Pain

EORTC Domain	Chronic Pain (n = 36)	No Chronic Pain (n = 165)	Mean Difference	Adjusted Mean Difference[a]	*P* Value[b]
Functioning scales					
Physical	71.3 (26.5)	84.2 (20.5)	−12.8	−14.4	<0.001
Role	64.7 (31.3)	84.8 (27)	−20.9	−22	<0.001
Cognitive	79.3 (24)	86.6 (17.9)	−7.9	−11.5	0.002
Emotional	74.3 (24.1)	88.9 (15.7)	−14.8	−12.2	<0.001
Social	63.1 (33.6)	84.1 (26.4)	−23.1	−20.2	<0.001
Global quality of life	52.8 (25.2)	73.4 (23.9)	−20.8	−19.9	<0.001
Symptom scales					
Fatigue	47.2 (3017)	20.7 (23.3)	26.4	24.2	<0.001
Nausea	25.9 (28.8)	7.9 (19.6)	17.9	15.3	<0.001
Pain	41.2 (33.6)	12.3 (22.5)	28.9	25.1	<0.001
Dyspnea	26.9 (33.6)	15.2 (24)	11.6	15.1	0.002
Insomnia	44.4 (36.5)	20.4 (26.6)	23.9	20.5	<0.001
Appetite loss	25 (28)	9.4 (21.8)	15.6	15.3	0.001
Constipation	16.2 (27.2)	14.9 (25.4)	1.3	4.8	0.35
Diarrhea	37.9 (36.6)	13.2 (23.7)	24.8	19.9	<0.001
Financial problems	25.4 (33.7)	5.7 (18)	19.8	17.2	<0.001

EORTC = European Organization for Research and Treatment of Cancer.

Data are means with standard deviations in parentheses.

[a]Multiple regression adjusted for age, gender, and cancer status.

[b]*P* value adjusted for mean difference.

ument the prevalence of CPSP in a Scottish cohort of patients likely to be representative of patients in most large hospitals. The prevalence of CPSP was 18 percent in surviving respondents at four years after surgery. Pain was predominantly neuropathic in nature, in the abdominal region, or adjacent to their old surgical wound. Twenty-nine of 36 patients (82 percent) reporting pain indicated that this was moderate to severe/unbearable in intensity with impact on their activities of daily living. The neuropathic nature and pain characteristics based on MPQ assessment were remarkably similar to those reported by patients with CPSP after other surgical procedures, including hernia,[4] cardiac,[5] and breast[13] surgery; "stabbing" was the symbol most frequently selected on body maps.

The prevalence of CPSP in this cohort was lower than other prevalence estimates (30–43 percent) from surgical studies in the Grampian Region of Scotland obtained using similar methodology.[14] This current study had a longer period between surgery and follow-up and had higher rates of attrition because of mortality and other factors. Although only 15 percent of patients failed to respond to the questionnaire survey, nonresponders were significantly younger and these patients are at higher risk of CPSP. We have previously reported younger age, female gender, and obesity as a risk factor for CPSP after other procedures[4,5]; younger age and female gender were identified as risk factors for CPSP after gastrointestinal surgery. Although one-half of our patient cohort were overweight or obese at time of follow-up, we found no association between BMI and CPSP after gastrointestinal surgery.

Interestingly, patients undergoing surgery for benign disease were more likely than those having cancer surgery to report CPSP at four years. These patients underwent surgery for conditions, including bowel obstruction, polyps, diverticulitis, and Crohn's disease. This study cannot comment on the relationship of preoperative pain to CPSP because baseline data on preoperative pain are not available. It is possible that the CPSP was not from the surgical procedure itself but from an underlying condition or other cause since surgery.

This study used standardized, validated questionnaires to assess pain and QOL. The MPQ has been widely used for clinical research and is validated for postal administration.[8,12] Although EORTC have published site-specific modules for patients with esophageal, gastric, pancreatic, and colorectal cancer, we used the core EORTC questionnaire because our study sample included patients with various medical conditions. Furthermore, the additional site-specific questionnaires contain sensitive questions relating to sexual activity and high rates of missing answers have been reported.[2] The core EORTC questionnaire includes specific gastrointestinal symptoms (*e.g.*, nausea, appetite loss, constipation, diarrhea) and thus provides a more detailed overview of postoperative health than other generic QOL measures (*e.g.*, Medical Outcomes Study Short Form 36 (SF-36)).

Females reported lower QOL functioning scores and worse symptom scores at follow-up compared with males, which has been reported in studies comparing gender differences in self-rated QOL in the general population.[15] Although there is less evidence of gender differences in the gastrointestinal surgery literature, there are reports that females with gastrointestinal disease, specifically inflammatory bowel disease, have poorer QOL.[16] In a prospective evaluation of the impact of age on QOL in rectal cancer resection patients, Schmidt *et al.*[17] reported comparable QOL scores by gender but significant differences by age. In their German study, older patients (aged 70 years or older) scored worse for physical functioning, global health, and had more severe symptoms, although QOL improved with time across all age bands, up to two years postoperatively. Our patient cohort had similar findings, with older survivors reporting poorer physical health, whereas younger patients reported more emotional distress, pain, diarrhea, and financial difficulties. Younger patients and those with CPSP were more likely to report that their physical condition or medical treatment had caused them considerable financial difficulties.

There is little evidence in the literature comparing QOL after gastrointestinal surgery for malignant and nonmalignant conditions.[18] Interestingly, patients who had cancer at time of surgery reported significantly better functioning scores and global QOL scores than those having surgery for benign conditions. Similarly, cancer patients had better scores for gastrointestinal symptoms at four years postoperatively and were less likely to report financial difficulties. These findings may be because of a healthy survivor effect, when patients with more aggressive disease have previously died, although the proportions of patients with benign and malignant disease were comparable at baseline and

follow-up. Patients with cancer may have a different outlook on symptom severity than those with benign conditions.[18] Preoperative assessment of pain status, psychologic status, and QOL would be required to explore these hypotheses further.

The final multivariate regression model for our gastrointestinal cohort revealed that QOL scores were significantly lower in patients reporting chronic pain compared with those who were pain-free, independent of age, gender, and cancer status similar to patients with CPSP after cardiac and breast surgery.[5,13] Other longitudinal studies of QOL after esophageal and colorectal surgery have reported gradual improvements in QOL scores with time and eventual restoration to baseline scores by one to two years postoperatively.[1,3,18]

The strengths of this study include the prospective design, with accurate baseline surgical data obtained independently on consecutive patients undergoing gastrointestinal anastomotic surgery at a major Scottish center during a one-year recruitment period. Only 6 percent of the original surgical cohort had transferred out of Northeast Scotland, reflecting the relative stability of the regional population. This study demonstrates that cohort methodology is a feasible approach for the long-term follow-up of surgical patients, with assessment of QOL and pain in 75 percent of eligible survivors four years after surgery. The excellent response rate is far higher than cohort studies of other medical conditions, which report high attrition rates (*e.g.,* obesity and diabetes cohort studies).[19] Although we have no formal assessment of the impact of recall bias, we did ask patients which month in 1999 they had surgery and compared this to the date recorded in the surgical database. Of those who responded, 81 percent correctly identified month of surgery at four years postoperatively.

This was an opportunistic study to define the prevalence of CPSP in an unselected cohort of patients undergoing major GI surgery through a laparotomy incision. Although this study is limited by the lack of preoperative pain and QOL data and we cannot absolutely relate chronic pain to the surgery rather than a continuation of the original or other medical conditions arising since surgery, it does for the first time document the magnitude of the problem after gastrointestinal surgery. This is particularly relevant as the move to advanced laparoscopic surgery in the type of patients studied in this cohort gathers pace.

CONCLUSIONS

This study assessed chronic pain and QOL four years after laparotomy for gastrointestinal surgery for malignant and nonmalignant conditions. The prevalence of CPSP after at four years postoperatively was 18 percent. Female gender and younger age were risk factors associated with the development of neuropathic CPSP. Mean QOL scores were significantly poorer in patients reporting CPSP independent of age, gender, and cancer status. Future studies of QOL related to GI surgery should incorporate baseline assessment of preoperative pain, psychologic status, and QOL.

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