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Musculoskeletal Pain in Gynecologic Surgeons

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Abstract

Objective—To describe the prevalence of musculoskeletal pain and symptoms in gynecologic surgeons.

Design—Prospective cross-sectional survey study (Canadian Task Force classification II-2).

Setting—Virtual. All study participants were contacted and participated via electronic means.

Participants—Gynecologic surgeons.

Interventions—An anonymous, web-based survey was distributed to gynecologic surgeons via electronic newsletters and direct E-mail.

Measurements and Main Results—There were 495 respondents with complete data. When respondents were queried about their musculoskeletal symptoms in the past 12 months, they reported a high prevalence of lower back (75.6%) and neck (72.9%) pain and a slightly lower prevalence of shoulder (66.6%), upper back (61.6%), and wrist/hand (60.9%) pain. Many respondents believed that performing surgery caused or worsened the pain, ranging from 76.3% to 82.7% in these five anatomic regions. Women are at an approximately twofold risk of pain, with adjusted odds ratios (OR) of 1.88 (95% confidence interval [CI], 1.1–3.2; $p < .02$) in the lower back region, OR 2.6 (95% CI, 1.4–4.8; $p < .002$) in the upper back, and OR 2.9 (95% CI, 1.8–4.6; $p < .001$) in the wrist/hand region.

Conclusion—Musculoskeletal symptoms are highly prevalent among gynecologic surgeons. Female sex is associated with approximately twofold risk of reported pain in commonly assessed anatomic regions. *Journal of Minimally Invasive Gynecology* (2013) 20, 656–660

Keywords

Disorders; Gynecology; Musculoskeletal; Pain; Surgeons

Surgeons comprise a unique group of individuals who are at high risk of developing work-related musculoskeletal symptoms. The physical demands of surgery, time pressures, and

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mental intensity in the operating room are factors that may contribute to muscular strain and injury. The negative effect of these symptoms on physician health and productivity may be substantial and potentially affect patient care.

Most literature on musculoskeletal diseases and disorders is based on health care workers as a heterogeneous group [1]. Initial research has involved nurses and nurses' aides [2,3]; however, more recently it has been focused on musculoskeletal symptoms in physicians in various specialties[4-8]. Studies from the literature on general surgery [6], pediatric otolaryngology [7], and plastic surgery [8] literature show varying prevalence (20%–80%) of musculoskeletal pain, in particular in the neck, lower back, and shoulders. Risk factors identified in some of these studies include female sex [7], fewer years of surgical experience [9], and ergonomics [6].

The primary objective of the present study was to determine the prevalence of work-related musculoskeletal symptoms in gynecologic surgeons. The secondary objective included identifying the relationship between these symptoms and sex, age, self-described working hours, and treatment. The findings may provide information about the scope of the problem and may be useful in developing preventive intervention strategies for gynecologic surgeons.

Materials and Methods

Survey Method and Characteristics

Institutional review board approval (#011-2011) was obtained from Mount Auburn Hospital (Cambridge, MA). An anonymous web-based survey was created and distributed to all AAGL physician members via two E-mail newsletters and one direct E-mail. A separate E-mail link was distributed to a list of past attendees (2008-2012) of the Surgical Film Festival (SURFF). The web-based survey was active for 2 months, from late March 2012 to the end of May 2012.

Exclusion criteria included inability to read English and lack of computer access to complete the survey. Surveys with <50% completion were subsequently excluded from analysis.

The survey design was a modification of the Standardized Nordic Questionnaire, which was published in 1987 and developed for analysis of musculoskeletal symptoms in an ergonomic or occupational health context [10,11]. We modified the questionnaire to improve readability and to better target our physician audience; pilot testing was performed with the five urogynecologic surgeons (E.A.E., P.L.R. and 3 others) at our hospital.

Questions were grouped in four main categories: demographics, surgical practice patterns, physical symptom duration, and physical symptom effect on work or leisure activities. The primary outcome was prevalence of musculoskeletal symptoms, according to body part, that occurred weekly and yearly among respondents. Secondary outcomes included the relationship between these symptoms and potential risk factors such as sex, age, self-reported working hours, and years in practice. Information about interference with work and hobbies, medication usage, types of other treatment, and history of surgical treatment for musculoskeletal injuries was also obtained.

Data Analysis

This was a descriptive study of trends among practicing gynecologic surgeons, and therefore an *a priori* sample size calculation was not performed. We attempted to obtain a sample size of 300 surveys, given our timetable and resources. Data are given as median and interquartile range or percentage. Comparisons between groups were made using the χ^2 or

Fisher exact test for categorical variables, and the Wilcoxon rank sum test for continuous nonparametric data.

Logistic regression was used to estimate the odds ratio and 95% confidence intervals for the associations between sex and musculoskeletal pain according to body part. Variables were considered potential confounders on the basis of univariate analysis and biologic plausibility. Confounders considered included age, body mass index, height, number of hours of exercise per week, number of hours spent operating per week, and electronic medical record use. Confounders that had an appreciable effect on the odds ratio for sex were retained in the final model.

All statistical tests were performed using STATA 1C 12.1 software (StataCorp, College Station, TX). All tests were two-sided, and $p < .05$ was considered statistically significant.

Results

The E-mail newsletter with survey link was sent to 12 527 AAGL physician members. Overall, 5090 E-mails were opened, resulting in 44 completed surveys. The survey link was then sent via direct E-mail to 8712 AAGL members and past attendees of the Surgical Film Festival. Altogether, 2625 physicians (30.1%) opened the E-mail, and 552 (21.0%) clicked on the link. The overall response rate of those who opened any of the E-mails was 7.9% (610 of 7715).

During the study, there were 610 respondents. Of these, 125 did not provide complete responses and they were excluded, leaving 495 complete responses for analysis. Of these, 401 physicians (81.0%) reported practicing medicine in the United States. Their median age was 47.0 years (range, 36.0–58.0 years), and half of the respondents (50.3%) were men. Seventy percent were white, 14.3% were Asian, 6.8% were Hispanic, and 8.9% were biracial or of other ethnicity. Most respondents (76.6%) were attending physicians, 13.9% were fellows, 8.7% were residents, and 0.2% were medical students. Most respondents were either general obstetrician-gynecologists (40.8%) or minimally invasive gynecologic surgeons (27.5%). The specialties of urogynecology (15.8%), general gynecology (9.1%), gynecologic oncology (2.8%), and reproductive endocrinology (3.4%) were also reported. Table 1 gives characteristics of all respondents stratified by sex.

Most respondents reported experiencing pain in at least one area of the body in the past 12 months. Respondents had a high prevalence of lower back (75.6%) and neck (72.9%) pain, as well as shoulder (66.6%), upper back (61.6%), and wrist/hand (60.9%) pain.

Many surgeons reported experiencing long-term pain, with >180 days of discomfort in the neck (19.5%), lower back (16.8%), upper back (14.3%), shoulders (14.6%), and wrist/hands (14.2%). A smaller percentage of respondents described daily or almost daily pain, ranging from 6.3% to 11.3% in the anatomic regions assessed. Table 2 gives this in detail.

Most respondents believed that performing surgery caused or worsened their pain, ranging from 76.3% to 82.7% in the various anatomic regions. A minority of respondents reported that pain prevented them from working, with the highest values in those with wrist/hand pain (10.9%) and lower back pain (7.8%). However, a substantial number admitted that pain affected either hobbies or chores, ranging from 21.9% to 36.3% in each anatomic region. Fifty-eight respondents (11.6%) admitted they had decreased their surgical practice because of injury or pain, and 34.8% believed their surgical performance was affected by injury or pain. Table 2 also gives the treatment-seeking behavior of respondents, with 15.5% to 23.3% seeking care from a physician. Previous surgery was rare; however, use of medication and non-medication strategies was more common.

Logistic regression was used to examine the effect of sex on pain in each anatomic region when controlling for age, body mass index, and height (Table 3). Women were at approximately twofold risk of pain, with an adjusted odds ratio of 1.88 (95% confidence interval [CI], 1.1–3.2; $p = .02$) in the lower back, 2.6 (95% CI, 1.4–4.8; $p = .002$) in the upper back, and 2.9 (95% CI, 1.8–4.6; $p = .001$) in the wrist/hand.

Discussion

Performing surgery is both physically and mentally demanding. Awkward postures, repetitive motions, forceful exertions, and incorrect monitor and equipment positioning are some of the potential factors that cumulatively lead to work-related musculoskeletal disorders [1].

Surgical training is long and arduous, and this process may naturally select for stoicism and tolerance of physical discomfort from being in the operating room. Pain may be considered part of the job, and the philosophy of working through the pain is typical of many surgeons [6]. The few studies in this area consistently demonstrate minimal awareness of ergonomic principles by surgeons [12].

With age and cumulative exposure to job stress, it might be expected that older surgeons are at higher risk of developing musculoskeletal problems. We found that age substantially affected symptoms in multiple regions including the neck, lower back, and upper back; however, shoulder and wrist/hand pain were not related to age. Other studies have reported that younger workers exhibited a higher prevalence of musculoskeletal problems because of their lack of experience and weaker operative skills [9]. It has been hypothesized that inexperience and anxiety may contribute to ergonomic errors such as higher grip force with instruments or excessive body contortion [9]. In addition, the healthy-worker effect may have a role in altering the rates of pain noted in practicing surgeons [13]. This is a form of selection bias by which healthy individuals are more likely to gain employment and remain employed; consequently, surgeons without injury or pain may be more likely to continue working than their counterparts with musculoskeletal symptoms [14].

Previous studies have suggested that women have a higher prevalence of musculoskeletal disorders than men do, although several of these studies had a limited number of female surgeons [6-8,15]. Including nearly 50% women, our study demonstrated that sex is an important risk factor when assessing musculoskeletal symptoms and disorders. We hypothesized that female surgeons may be at an ergonomic disadvantage in the operating room because of certain physical characteristics such as generally being shorter and having less upper body strength. In addition, surgical instrumentation is usually designed for the larger male hand [16].

Our finding that female sex consistently increased the reporting of pain is important in our field because women represent nearly 80% of all residents in obstetrics and gynecology and approximately 50% of all active obstetrician-gynecologists [17]. Of note, our cohort of women was more than a decade younger than their male counterparts but reported approximately twice as much discomfort across all body areas assessed.

Limitations of the present study were evident in the survey format and design. In any self-report of symptoms, selection bias is an inherent challenge. Physicians who experience musculoskeletal pain or who are interested in ergonomics are more likely to respond. Another limitation of the study was the low response rate. Although the web-based survey was available for 2 months, the newsletter notifications produced few responses, likely because the newsletter was general and the survey link was not prominent. In addition, only one direct E-mail was sent to the AAGL list, to limit E-mails to members. Because of the

diversity of procedures performed in gynecology, we did not elicit specific operative procedures that contribute to discomfort. For example, lengthy or complex laparoscopic procedures such as sacrocolpopexy may be more likely to cause symptoms. On the other hand, factors such as a large uterus or presence of adhesions can substantially alter the duration of laparoscopic hysterectomy. Some physical areas of discomfort were not specifically listed, and pain quality or severity was not elicited for the sake of survey brevity. Similarly, we did not ask about every type and frequency of medical treatment our respondents used.

Our work was an initial exploration into the musculoskeletal symptoms experienced by gynecologic surgeons. Inasmuch as musculoskeletal disorders are potentially career altering or career ending, we believe that increased awareness and prevention are the keys to averting serious injury that can affect surgeon livelihood, quality of life, and productivity. The high percentage of women in the present study and the increasing number of women in the specialty should serve as a warning to practicing surgeons, training programs, and medical device manufacturers. Future work in this area should identify potential modifications in procedure performance or physical activity programs that can help to avert these disorders.

In conclusion, musculoskeletal symptoms are highly prevalent among gynecologic surgeons. Female sex is associated with an approximately twofold risk of reported pain in commonly assessed anatomic regions.

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Table 1Respondent characteristics^a

Characteristic	Respondents			p value
	Total (n = 495)	Men (n = 249)	Women (n = 246)	
Age (yrs)	47.0 (36.0–58.0)	53.0 (43.0–61.0)	38.0 (33.0–50.0)	<.001
Height (inch)	67.3 (65.0–70.0)	70.0 (68.0–72.0)	65.0 (63.0–67.0)	<.001
Weight (kg)	74.8 (62.8–86.2)	85.9 (76.1–93)	63.5 (56.7–72.6)	<.001
Body mass index	25.1 (22.5–28.3)	26.6 (24.6–28.9)	23.1 (21.3–26.5)	<.001
Years in practice	18 (7.5–28)	25.5 (13–33)	7.5 (7.5–23)	.001
Operating hours per week	8(8–13)	8(8–13)	8 (8–18)	.72
Hours of exercise per week	3 (0.5–3)	3 (0.5–3)	3 (0.5–3)	.62
Right-handed surgeon	463 (93.5)	229 (92.0)	234 (95.1)	.15
Electronic medical record user	351 (70.9)	163 (65.5)	188 (76.4)	.01

^aData are given as median (interquartile range) or No. (%).

Table 2Musculoskeletal discomfort according to body regions with most prevalent symptoms^a

Variable	Neck	Lower back	Upper back	Shoulder	Wrist/hand
No. of surgeons	425	426	393	398	391
No. of surgeons with discomfort in past 12 months	310	322	242	265	238
Duration of discomfort in past 12 months (day)					
0	115 (27.1)	104 (24.4)	151 (38.4)	133 (33.42)	153 (39.1)
1–30	176 (41.4)	170 (39.9)	121 (30.8)	139 (34.9)	139 (35.6)
31–180	51 (12.0)	80 (18.8)	65 (16.5)	68 (17.1)	43 (11.0)
>180, not daily	35 (8.2)	38 (8.9)	29 (7.4)	33 (8.3)	28 (7.1)
Daily/almost daily	48 (11.3)	34 (7.9)	27 (6.9)	25 (6.3)	28 (7.1)
Pain caused or worsened by performing surgery					
Caused	83 (26.8)	61 (18.9)	69 (28.5)	73 (27.6)	89 (37.4)
Worsened	157 (50.7)	186 (57.8)	131 (54.2)	135 (50.9)	92 (38.9)
No/does not apply	70 (22.6)	74 (22.9)	41 (16.7)	55 (20.8)	54 (22.7)
Data missing	0	1 (0.3)	1 (0.4)	2 (0.8)	3 (1.3)
Pain prevented doing work					
Yes	12 (3.9)	25 (7.8)	9 (3.7)	14 (5.3)	26 (10.9)
No	293 (94.5)	291 (90.4)	227 (93.8)	246 (92.8)	207 (87.0)
Data missing	5 (1.6)	6 (1.9)	6 (2.5)	5 (1.9)	5 (2.1)
Pain prevented doing hobbies or chores					
Yes	77 (24.8)	117 (36.3)	53 (21.9)	69 (26.1)	61 (25.6)
No	222 (71.6)	195 (60.6)	180 (74.4)	188 (70.9)	167 (70.2)
Data missing	11 (3.6)	10 (3.1)	9 (3.7)	8 (3.0)	10 (4.2)
Use of over-the-counter medication (times/wk)					
0	175 (56.45)	172 (53.4)	135 (55.8)	158 (59.6)	164 (68.9)
1–6	113 (36.5)	122 (37.9)	83 (34.3)	87 (32.8)	51 (21.4)
7, daily	15 (4.9)	18 (5.6)	15 (6.2)	13 (4.9)	12 (5.0)
Data missing	7 (2.3)	10 (3.1)	9 (3.7)	7 (2.6)	11 (4.6)
Use of non-medical strategies, i.e., ice, heat, stretching (times/wk)					
0	99 (31.9)	94 (29.2)	76 (31.4)	100 (37.7)	139 (58.4)
1–6	158 (51.0)	170 (52.8)	123 (50.8)	86 (46.8)	67 (28.2)
7, daily	39 (12.6)	43 (13.4)	31 (12.8)	29 (10.9)	21 (8.8)
Data missing	14 (4.5)	15 (4.7)	12 (5.0)	12 (4.5)	11 (4.6)
Use of opioids/muscles relaxants (ever)					
Yes	64 (20.7)	83 (25.8)	40 (16.5)	40 (15.1)	15 (6.3)
No	233 (75.2)	228 (70.8)	189 (78.1)	210 (79.3)	211 (88.7)
Data missing	13 (4.2)	11 (3.4)	13 (5.4)	15 (5.7)	12 (5.0)
Previous surgery					
Yes	7 (2.3)	19 (5.9)	1 (0.4)	10 (3.8)	10 (4.2)
No	244 (78.7)	247 (76.7)	194 (80.2)	203 (76.6)	173 (72.7)
Data missing	59 (19.0)	56 (17.4)	47 (19.4)	52 (19.6)	55 (23.1)

^aData are given as No. (%).

Table 3

Crude and adjusted odds ratios for effect of sex on risk of pain according to anatomic region

Anatomic region	Crude OR (95% CI)	p value	Adjusted OR (95% CI)	p value
Neck	2.8 (1.8–4.3)	.001	1.6 (.88–3.1) ^a	.12
Lower back	2.0(1.3–3.1)	.003	1.88 (1.1–3.2) ^b	.02
Shoulder	2.0(1.3–3.1)	.001	1.6 (.90–2.8) ^c	.11
Upper back	3.8 (2.5–5.9)	.001	2.6 (1.4–4.8) ^a	.002
Wrist/hand	2.4(1.6–3.7)	.001	2.9 (1.8–4.6) ^d	.001

CI = confidence interval; OR = odds ratio.

^a Adjusted for age and height in inches.^b Adjusted for age and body mass index.^c Adjusted for height in inches.^d Adjusted for body mass index.