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Awareness of the association between obesity and peri-operative risk among newly diagnosed patients with complex atypical hyperplasia and endometrial cancer

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Abstract

Objectives—To evaluate knowledge of obesity-related peri-operative risks in with women newly diagnosed complex atypical hyperplasia and endometrial cancer.

Methods—Cross sectional study of patients newly diagnosed with complex atypical hyperplasia or endometrial cancer who underwent preoperative counseling between 2011 and 2014, using a 17-item questionnaire. Obesity was defined as body mass index (BMI) of 30 kg/m2 or greater. Bivariate analysis was conducted using Pearson's Chi-Square or Fisher's Exact tests where appropriate and Mann-Whitney U for continuous variables.

Results—Of 98 patients recruited, mean age was 58 years, 87% were obese, 83% white, and 51% had grade 1 endometrioid adenocarcinomas. Sixty-four percent of obese women reported that their physicians had discussed surgical risks related to obesity. However, 17% of obese and 42% of non-obese patients responded that they were unsure of the peri-operative risks associated with obesity. There was substantial lack of understanding among obese patients regarding their increased risks of respiratory problems (29%), thromboembolism (29%), heart attack (35%), or longer operating time (35%) and hospital stay (47%). However, obese patients were more aware of wound infection risks associated with obesity compared to their non-obese counterparts (72% vs. 31%, p=0.004).

Conclusions—Pre-operative counseling for obese women with newly diagnosed endometrial cancer should incorporate more focused education about obesity-related risks. They report being knowledgeable about the risks associated with their surgery, however, more than a quarter are

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unaware of the impact obesity has on respiratory problems, thromboembolism, wound infection, heart attack or longer operating time and hospital stay.

Keywords

Knowledge of obesity-related surgical risks

Background

Obesity is a growing problem in the United States over the past 20 years with the prevalence remaining high despite new regulations and interventions implemented by the U.S. Department of Health and Human Services, the Centers for Disease Control and Prevention (CDC), the Institute of Medicine, and the U.S. Surgeon General [1]. Results from the 2011–2012 National Health and Nutrition Examination Survey (NHANES) estimated 34% of U.S. adults are overweight, 35% are obese, and 6% are extremely obese [2].

Obese women are a vulnerable population who face not only economic hardships and social isolation, but medical comorbidities as well. They are at increased risk of heart disease, diabetes, hypertension, stroke, hyperlipidemia, osteoarthritis, sleep apnea, and certain cancers such as endometrial, breast, and colon cancer. Among these, endometrial cancer has the highest association with obesity with up to a 9-fold increased risk of mortality in women with body mass index (BMI) > 40 compared to women of normal weight (RR 6.25, $p < 0.001$, 95%CI 3.75–10.42)[1, 3].

Unfortunately, obesity predisposes women not only to pre-invasive and invasive uterine cancer, but it also places them at higher risk for complications related to surgical treatment options. The integration of minimally invasive surgical techniques in gynecologic oncology has improved peri-operative morbidity and length of hospital stay [4, 5]. However, there remain specific risks related to obesity that warrant pre-operative discussion such as longer operative time, diminished tissue oxygenation and immune function, and increased risks for deep venous thrombosis, pulmonary embolism, respiratory failure and need for mechanical ventilation, cardiac complications, nerve injury, infection and bleeding[6–8].

Despite a growing medical interest establishing the link between obesity it is unclear how much information is effectively communicated to patients to heighten their understanding. Given that obesity is a modifiable risk factor with widespread implications in cancer prognosis and treatment options, it is imperative to first ascertain where gaps in knowledge exist in order to design effective interventions to guide patient education. There is limited but growing evidence that women are unaware that obesity increases the risk for complex atypical hyperplasia (CAH) and endometrial cancer [9, 10]. However, to our knowledge, there are no studies to date that focus on their understanding of the impact obesity has on surgical management options and potential complications. Therefore, we aimed to evaluate knowledge of obesity-related peri-operative risks in women with newly-diagnosed CAH or endometrial cancer and to identify areas for improvement in peri-operative counseling.

Materials and Methods

We performed a single institution survey study of 98 women newly-diagnosed with CAH or endometrial cancer between January 2011 and July 2014. Prior to the initiation of the study, all procedures were reviewed and approved by Washington University's Human Research Protection Office (HRPO#201101905). All participants were at least 18 years of age, able to read and write in English and provide signed informed consent. We included patients with CAH given that this disease is part of a continuum of uterine pathology with shared risk factors for endometrial cancer and evidence to suggest that up to 43% of women with CAH have occult grade 1 endometrial cancer [11]. Diagnoses were established by pre-operative endometrial tissue sampling and all specimens underwent central review by the Department of Pathology at Barnes Jewish Hospital. Furthermore, both obese and non-obese patients were included to assess for differences in knowledge of surgical risks related to obesity based on body mass index (BMI). Obesity was defined as BMI of 30 kg/m^2 or greater.

We excluded patients with recurrent disease and confirmed all diagnoses by documented histology on pathology reports. All patients invited to participate were under the care of gynecologic oncologists at Washington University School of Medicine and Siteman Cancer Center, a National Cancer Institute-designated comprehensive cancer center. No patients were eligible or approached after surgery.

During their preoperative-planning, outpatient appointment, patients were approached if eligible and were assured of anonymity and confidentiality. They were allowed to complete the questionnaire at the time of their appointment in a private room, or later at home returning forms in a self-addressed envelope provided. Those who did not return the survey after 2 weeks were followed-up with a telephone call as a courtesy reminder.

A 17-item questionnaire was administered. We did not identify a validated questionnaire of this type. However each question in the survey was supported by prior studies citing specific surgical complications related to obesity and was validated by review by a panel of gynecologic oncologists. The questionnaire also obtained sociodemographic information including age, race, history of smoking, alcohol and illicit drug use, and highest level of education. We reviewed electronic medical records to confirm each patient's past medical and surgical history, as well as obtain their American Society of Anesthesiologists (ASA) score.

Demographic information was summarized with descriptive statistics. Bivariate analysis was conducted using Pearson's Chi-Square or Fisher's Exact tests where appropriate for categorical variables. The Anderson-Darling test along with visual assessment of histograms were used to determine whether the distribution of continuous variables was Gaussian. The variable, "age" was found to be normally distributed and bivariate analysis was conducted with the Student's t-test. All other non-parametric, continuous variables were analyzed using the Mann-Whitney U test. Analysis was performed using Stata 10 (College Station, Texas) and an association was considered statistically significant if $p< 0.05$.

Results

Between 2011 and 2014, 107 women met eligibility criteria and consented for study enrollment, of whom 98 women (92%) completed the self-administered questionnaire. Eight-five had a BMI > 30 kg/m^2 and of these women, 79 (93%) acknowledged their obesity while 6 (7%) were unsure if they met criteria for obesity. Overall, the mean age was 58 years, 83% were white, 54% had achieved a college education or higher, and half had grade 1 endometrioid adenocarcinoma (51%) on preoperative endometrial biopsy. Compared to patients with BMI < 30 kg/m^2, obese patients had more comorbidities such as hypertension (p=0.009), diabetes (p=0.004), and hyperlipidemia (p=0.04). There were no significant differences between obese and non-obese women with regards to ASA score or number of prior surgeries (Table 1).

While the overwhelming majority of women correctly recognized obesity as a risk factor for high blood pressure, diabetes, and heart attacks, they had more limited appreciation of the association between obesity and cancer. Nearly half of obese patients and 31% of non-obese patients answered that endometrial cancer is more common in overweight or obese people.

Next we explored patients' understanding of their surgical risks. Among obese patients, 92% percent reported that their physician had discussed specific risks associated with the indicated procedure versus only 64% recalled obtaining information about obesity-related surgical risks. Among all patients, 75% understood that the risks of surgery are increased in obese patients compared to patients of normal weight. However, 16% of obese and 38% of non-obese women responded that they were unsure of the specific peri-operative risks associated with obesity. There was a substantial gap in understanding among obese patients regarding their increased risks of respiratory problems (29%), thromboembolism (29%), heart attack (35%), or longer operating time (35%) and hospital stay (47%) (Table 2). However, although a significant minority of obese women were unaware of the link, obese patients were more aware of wound infection risks associated with obesity than their non-obese counterparts (72% vs. 31%, p=0.004).

Conclusion

Patients with CAH and endometrial cancer appear to be well-informed that obesity is a risk factor for medical comorbidities such as hypertension, diabetes, and heart disease, but their scope of knowledge beyond this is limited. Only half of obese patients recognized that their weight places them at increased risk for endometrial cancer and 36% were not aware of obesity-related surgical risks. Furthermore, they report being knowledgeable about the risks associated with their planned operative procedure, however, more than a quarter are unaware of the impact obesity has on respiratory problems, thromboembolism, wound infection, heart attack or longer operating time and hospital stay.

Our findings provide new insight into patients' limited awareness of the peri-operative risks related to obesity and reinforce the need for more focused education about obesity-related risks. In 2003, Harvard University's Interfaculty Program for Health System's Improvement conducted a national poll of 1,002 men and women aged 18 or older to explore their

knowledge about obesity. Similar to our findings, most Americans knew that obesity increases the risk of hypertension (86%), diabetes (78%), and heart disease (86%), but only half of participants were aware that obesity also increases the risk of some cancers [12]. More recently, Soliman et al[13] conducted a study among women in the Houston community assessing their knowledge of obesity and endometrial cancer risk. Again, consistent with our results, 58% were not aware that obesity increased the risk for endometrial cancer. There was no association between personal weight and knowledge of obesity-associated risks, however, they did find that black women were least knowledgeable about the relationship between obesity and cancer.

These gaps in knowledge are clinically significant, as obesity is a modifiable risk factor that is becoming a central challenge in cancer prevention and care with widespread impact on diagnosis, available treatment options, and ultimately survival outcomes [9]. A landmark study by Calle et al[1] heightened awareness of the magnitude of this problem. They reported women with a BMI > 40 kg/m^2 have a 60% higher death rates from all cancer compared to women of normal weight. Furthermore, they predicted the proportion of deaths from cancer that is attributable to overweight and obesity in U.S. adults aged 50 or older may be as high as 20% in women [1].

Appropriately, obesity has become a pivotal issue in women's health [14]. The American Society of Clinical Oncology (ASCO) recently released a policy statement[9] identifying 4 priorities to address the obesity-cancer link including: 1) increasing providers' and patients' core knowledge about the role of energy balance in cancer risk and prevention; 2) developing clinical guidance and resources to help providers educate their patients; 3) research promotion; and 4) improving access to evidence-based obesity treatment services for cancer patients and survivors.

The ASCO policy statement also highlights that a cancer diagnosis may serve as a teachable moment to discuss risk-reducing or health-protective behaviors. A survey of U.S. gynecologic oncology providers affirmed this window of opportunity, stating that 85% agreed or strongly agreed on the importance of addressing obesity with cancer survivors [15]. Historically, oncologists have played a limited role in weight loss management for their patients, as the direct implications of obesity on treatment options may not have been fully realized in the past. However with time, the growing obesity epidemic has pushed not only the upper limits of BMI values, but also the number of safe management options we can offer our patients. For many obese women with CAH or endometrial cancer, robotic surgery has provided a feasible surgical approach, but for others with extreme obesity (BMI ≥ 40 kg/m^2), the risks of surgery may outweigh the benefits, and alternative treatment options such as radiation, chemotherapy and/or hormonal therapy should be discussed.

While our findings provide insight to women's knowledge regarding obesity-related risks as they pertain to medical comorbidities, endometrial cancer, and peri-operative risks, this study is not without limitations. We acknowledge our small sample size and the potential for selection and recall bias that is inherent to any survey study. Time constraints in the clinic and uneasiness with the topic are potential reasons more patients were not enrolled or were not enrolled more quickly over our 4-year study period. Furthermore, physicians were not

blinded and the amount of discussion time spent in the pre-operative visit regarding obesity-related risks could have directly influenced providers' decisions to enroll eligible patients into this survey study. Despite these limitations, we also recognize that potential selection biases would likely favor inclusion of more knowledgeable patients, suggesting that 36% may be an underestimation of women's awareness of obesity-related peri-operative risks. Regardless, our findings are in congruence with prior published reports and provide evidence that pre-operative counseling for obese women with newly diagnosed CAH or endometrial cancer should incorporate more focused education about obesity-related risks.

Our knowledge of the link between obesity and cancer risk and survival outcomes continues to expand and gain momentum. Obesity is a multifactorial disease that warrants a concerted action at both the individual and societal level, beginning first with improved patient awareness and education. Our study highlights the need for focused discussions with CAH and endometrial cancer patients. These discussions should not only address the link between obesity and cancer, but also should incorporate the impact of weight on surgical management and specific obesity-related peri-operative risks. Gynecologic oncologists are in a pivotal position to positively impact survival outcomes by recognizing and seizing teachable moments about obesity and lifestyle modifications throughout our lifelong relationship with our cancer patients.

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Table 1

Patient demographics by body mass index

Characteristics	Obese N=85	Non-Obese N=13	P
Age, year (mean)	58(9.5)	53(14.5)	0.536
Race			
White	71(84)	12(92)	0.701
Black	13(15)	1(8)	
Other	1(1)	0(0)	
Body mass index			
<30	0	13	
30–34	16	0	
35–39	20	0	N/A
40–44	23	0	
45–50	12	0	
>50	14	0	
Education *			
High school/GED	34(42)	7(54)	0.423
College or higher	47(58)	6(46)	
Smoker *			
No	77(92)	11(85)	0.155
< 1 pack per day	3(4)	2(15)	
≥1 pack per day	4(5)	0(0)	
Alcohol consumption per week *			
None	59(69)	5(39)	0.078
Occasionally	25(29)	8(62)	
>3 Drinks	1(1)	0(0)	
Illicit drug use			
Yes	2(2)	0(0)	1.000
No	83(98)	13(100)	
Comorbidities			
Diabetes	43(51)	1(7)	0.004
Hypertension	63(74)	5(39)	0.009
Cardiac problems #	16(19)	2(15)	0.766
Respiratory problems †	22(26)	4(31)	0.710
Hyperlipidemia	39(46)	2(15)	0.038
ASA Score, median (IQR)	3(1)	2(1)	0.188

Characteristics	Obese N=85	Non-Obese N=13	P
Number of prior surgeries, median (IQR)	2(2)	2(3)	0.309
Preoperative grade ¥			
1	44(67)	6(55)	0.141
2	10(15)	2(18)	
3	12(18)	2(18)	
Preoperative histology			
Complex atypical hyperplasia	1(1)	0(0)	
Endometrioid	73(86)	8(62)	0.100
Serous	4(5)	1(8)	
Other	7(8)	4(31)	

Legend:

GED = general educational development; ASA = American Society of Anesthesiologists; IQR = interquartile range.

* Missing data.

Includes coronary artery disease, myocardial infarction, arrhythmias, congestive heart failure, valvular abnormalities..

† Includes asthma, chronic obstructive pulmonary disease, or obstructive sleep apnea

¥ Preoperative grade only includes patients with endometrial cancer and excludes the one case of complex atypical hyperplasia.

Table 2

Patient responses to obesity awareness questionnaire

Survey Questions	Obese N=85	Non-Obese N=13	P
Did your doctor discuss with you the specific risks associated with your procedure?			
Yes	78(92)	10(77)	0.100
No/Not Sure	7(8)	3(23)	
Missing	0(0)	0(0)	
Did your doctor discuss with you the specific risks associated with surgery in overweight or obese?			
Yes	54(64)	4(31)	0.058
No/Not Sure	30(35)	8(62)	
Missing	1(1)	1(8)	
The risks of surgery in overweight or obese patients are:			
Higher	64(75)	7(54)	0.218
Same	4(5)	0(0)	
Lower	1(1)	0(0)	
Not Sure	14(16)	5(38)	
Missing	2(2)	1(8)	
Do you consider yourself overweight or obese?			
Yes	79(93)	5(39)	<0.001
No/Not Sure	6(7)	8(62)	
Missing	0(0)	0(0)	
Is endometrial cancer more common in overweight or obese people?			
Yes	42(49)	4(31)	0.196
No/Not Sure	42(49)	9(69)	
Missing	1(1)	0(0)	
Does obesity increase the risk of….			
breathing problems?			
Yes	60(71)	8(62)	0.529
No/Not Sure	25(29)	5(39)	
Missing	0(0)	0(0)	
wound infection?			
Yes	61(72)	4(31)	0.004
No/Not Sure	24(28)	9(69)	
Missing	0(0)	0(0)	
clots in leg and/or lungs?			
Yes	59(69)	7(54)	0.238
No/Not Sure	25(29)	6(46)	

Survey Questions	Obese N=85	Non-Obese N=13	P
Missing	1(1)	0(0)	
heart attacks?			
Yes	55(65)	6(46)	0.199
No/Not Sure	30(35)	7(54)	
Missing	0(0)	0(0)	
longer and more difficult surgery?			
Yes	55(65)	6(46)	0.321
No/Not Sure	30(35)	7(54)	
Missing	0(0)	0(0)	
length of hospital stay after surgery?			
Yes	44(52)	7(54)	0.922
No/Not Sure	40(47)	6(46)	
Missing	1(1)	0(0)	
Does obesity lead to….			
diabetes?			
Yes	84(99)	13(100)	1.000
No/Not Sure	1(1)	0(0)	
Missing	0(0)	0(0)	
high blood pressure?			
Yes	83(98)	13(100)	1.000
No/Not Sure	2(2)	0(0)	
Missing	0(0)	0(0)	
heart attacks?			
Yes	78(92)	13(100)	1.000
No/Not Sure	5(6)	0(0)	
Missing	2(2)	0(0)	

Legend: None