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The Effect of Obesity On The Outcomes of Laparoscopic Hysterectomy: A Literature Overview

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ABSTRACT

In the last decades, obesity has reached epidemic proportions in the world (40% in certain countries). It predisposes to many diseases and morbidities in both males and females. In the latter, obesity predisposes to multiple gynecological conditions requiring hysterectomy such as endometrial cancer. Over the years, technical improvements have allowed surgeons to perform a hysterectomy in a minimally invasive approach (laparoscopically) with clear benefits, safety and better outcomes compared to the abdominal approach. The aim of this review is to provide an overview of the effects of obesity on the outcomes of laparoscopic hysterectomy performed both for benign and malignant gynecological pathologies. We performed literature research on the electronic database PubMed from the database inception through June 29, 2019. Obesity does not seem to increase adverse outcomes in laparoscopic hysterectomy as compared to the increased postoperative complication rate after open surgery. Therefore, laparoscopic hysterectomy can be performed safely in this population and represent the approach of choice.

Key Words: Obesity; Hysterectomy; Laparoscopy; Endometrial cancer; Minimally invasive surgery; Outcomes.

Introduction

In the last decades, obesity has reached epidemic proportions both in developed and developing countries (1). Obesity is defined as a body mass index (BMI) equal or higher than 30, and it is classified according to the value of BMI in class 1 (30 <BMI <34.9), class 2 (35 <BMI <39.9), and class 3 or severe obesity (BMI> 40). According to the World Health Organization, it is estimated that the 13% of the world population is obese, with a higher predominance of women as compared to men (37% vs 27.4%) (2). In this regard, obesity represents a significant risk factor for many gynecological diseases, of which some have a hysterectomy as the primary therapeutic approach (3-9). Laparoscopic hysterectomy (LH) was introduced in 1989 by Reich et al. and underwent a progressive technical development allowing surgeons to perform even more complex procedures with this minimally invasive approach. Nevertheless, abdominal hysterectomy (AH) remains the most common surgical approach, and only in the last decades, the minimally invasive approach underwent a significant progressive implementation even in the United States with a significant reduction of complications (10-12). Indeed, the minimally invasive approach for hysterectomy is associated with evident advantages over laparotomy (10, 13). In obese patients, surgeons are faced with clinical and technical challenges during hysterectomy and with a higher rate of complications and morbidity in the postoperative period (14). Nevertheless, preoperative planning represents a fundamental step to reduce cardiovascular risks related to long period Trendelenburg positioning. An adequate bowel preparation even impacts on the feasibility of complex laparoscopic procedures. Another risk in obese patients is accessing the abdominal cavity as the surgeon should increase the angle of insertion of the needle to avoid bowel or vessels

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injuries and, in particular cases, handle specialized laparoscopic equipment.

Nevertheless, the majority of pieces of evidence are related to the open surgery, and only in the last decades, new evidence is reported about the effect of obesity on hysterectomy performed with a minimally invasive approach. On that basis, here we report a narrative review aimed to summarize the available pieces of evidence about this topic.

Material and Methods

As a narrative review, we performed literature research on the electronic database PubMed from the database inception through June 29, 2019; in order to identify manuscripts reporting about the effect of obesity on the outcomes of LH performed both for benign and malignant gynecological pathologies. The searches were performed using the Medical Subject Headings (MeSH) unique ID term "Body Mass Index" (ID: D015992) with "Obesity" (ID: D009765), "Laparoscopy" (ID: D010535), "Hysterectomy" (ID: D007044) and "Morbidity" (ID: D009017). After the exclusion of duplicates, the manuscript selection was performed based on the title, abstract and, for the final selection, on the full text.

Results

For the aim of this narrative review, we identified five manuscripts reporting data about the morbidity related to BMI in patients underwent LH for both malignant and benign gynecological diseases. A retrospective study with a systematic review and four retrospective studies performed on national databases were identified. The characteristics of the selected studies are summarized in Table 1.

Bouwman et al. (15) performed a retrospective study aimed to evaluate the association between the BMI and the perioperative complications in women underwent both LH and open hysterectomy for the treatment of endometrial cancer. In obese women, they reported a higher rate of postoperative surgical complications, such as wound complicated healing and higher use of antibiotics. Noteworthy, they reported a different pattern of complications in the LH group, as summarized in table 2, LH was related to wound dehiscence in patients with BMI ≥ 40 only. All these results were consistent with those reported in the concomitant review of the literature, including 13 studies. None of these studies reported an association between intraoperative complications and BMI in women underwent surgery for endometrial cancer.

Regarding benign gynecological diseases, four studies investigated the role of BMI on the perioperative complications of LH using national registry data (16, 17). Tyan et al. (16) include in their analysis 159,025 patients, and they reported non-obese patients (18.5 <BMI <25) less likely to undergo hysterectomy by open surgery (30%). Conversely, the open surgery was the most used in those with class 3 obesity (BMI ≥ 40). The association between LH complications and the different classes of obesity is summarized in Table 3. Wound complications (superficial and deep infections, and wound dehiscence) and pulmonary complications were increased in class 2 and class 3 obesity that was not reported associated to an increased rate of other complications, such as thromboembolic events, cardiac or renal complications, sepsis, and mortality at 30 days postoperatively (16). Paradoxically, obesity resulted in protective against surgical revision within the first 30 postoperative days and associated with a lower risk of readmission within the same period compared to non-obese patients (16). Noteworthy, hysterectomy performed with open surgery was associated with a higher rate of postoperative complications as compared to LH.

Comparable results were reported using the Swedish national registry by Bohlin et al. (17). They investigated the impact of obesity and smoking on hysterectomies for benign indications between 2004 and 2013. In this series, 2,063 out of 28,537 hysterectomies were performed laparoscopically. The analyzed variables were intraoperative blood loss, intraoperative complications, operative time, postoperative complications, and postoperative infection. After multiple logistic regression, in women underwent LH the BMI higher than 30 was associated only to an increased operative time (OR 1.71; 1.30-2.26) and does not appear related to an increased rate of other complications (17). On the other hand, after open hysterectomy, BMI ≥ 30 was related to higher intraoperative blood loss, higher perioperative and postoperative complications rate, and longer operative time. Similarly resulted were reported by Shah et al. (18), who studied the association between BMI and morbidities related to laparoscopic, abdominal and vaginal hysterectomies for benign indications. They used the database of the US national registry between 2005 and 2012 that included 55,409

Table 1. Summary of the selected studies

Title	Year of publication	Study type/country	Number of participants	Indication of hysterectomy	BMI
Bouwman, et al.	2015	Retrospective study/Systematic review	8453	Endometrial cancer	<30 30-39.9 >40
Tyan, et al.	2019	Retrospective National database/US	159,025	Benign conditions	All
Bohlin, et al.	2016	Retrospective National database/ Sweden	28,537	Benign conditions	All
Shah, et al.	2015	Retrospective National data/US	55,409	Benign conditions	All
Osler, et al.	2011	Prospective National Denmark	20,353	Benign conditions	All

hysterectomies, of which 26,609 done laparoscopically. The analyzed variables were operating time, length of hospital stay, readmission in 30 days, surgical revision in 30 days, blood transfusion, wound dehiscence, infections (urinary, wound, sepsis), and thromboembolic events (18). Results of analysis showed no association between BMI and surgical outcomes other than a longer operative time in women underwent LH (18). Conversely, in case of open surgery, BMI resulted associated with a higher risk of wound dehiscence, wound infection, and sepsis. These results were further confirmed by the study of Osler et al. (19). They investigated the surgical outcomes after hysterectomy in 20,353 women, including the 17.5% of obese women. BMI ≥ 30 was related to an increased risk of bleeding complications and infection only in open surgery, with no differences in the complication rate in obese versus non-obese patients underwent LH (19).

Discussion

The evidence provided by the selected studies highlights the key role of minimally invasive surgery for the management of obese women with gynecological diseases. All the selected studies consistently reported obesity associated with a higher rate of postoperative complications after hysterectomy performed with the open surgical approach, both for benign and malignant gynecological pathology. Conversely, this association was almost reported absent after LH.

In the systematic review of LH in endometrial cancer, obesity was not associated with higher morbidity, with the only exception of the wound dehiscence in class 3 obesity. This study has also shown the better outcomes of LH as compared to the open approach for the management of endometrial cancer in the obese population (15). A meta-analysis, involving nine randomized controlled trials, showed the benefits of laparoscopic over an open hysterectomy in terms of significant complications, total complications and postoperative complications in patients with endometrial cancer (10). Moreover, a systematic review of hysterectomies for benign and malignant indications in obese group concluded that LH and vaginal hysterectomy should be privileged over open surgery in this population (obesity class 2 and 3) (20). Regarding benign pathologies, the association of obesity with wound complications exists in only one of the four studies (16-19), and two of them have shown that a BMI ≥ 30 increased operative time (17, 18), that can be explained by the extra time needed for the realization of pneumoperitoneum and visualization of the pelvic structures. Moreover, thromboembolic complications rate does not seem increased with BMI in both benign and malignant conditions after LH (15-19, 21). Two of the studies found that overweight, obese and morbidly obese women undergoing LH were less likely to be re-operated within 30 days of the initial

Table 2. Results of the systematic review by Bouwman et al. (2015): association between complications in laparoscopic hysterectomy and BMI

	Intraoperative complication	Wound dehiscence	Wound infection	Operative time	Conversion to laparotomy	Transfusion
Association with obesity	-	+ in BMI≥40*	-*	-*	-	-

Association = +; No association = -.*Association exists in laparotomy series

intervention (16, 18). One of them concluded that this population is at a lower risk of readmission compared to non-obese patients (16).

This narrative review selected the studies with a more significant study population to provide the most strength evidence considering the absence of randomized controlled trials. The growing body of evidence supports the critical role of laparoscopy as the approach of choice for the management of gynecological diseases (22-27), and the evidence summarized in this review highlight the crucial role of laparoscopy to reduce complications in obese women after hysterectomy.

Nevertheless, as reported by Tyan et al. (16), obese patients are less prone to undergo minimally invasive surgery as compared to women with normal BMI. This because minimally invasive surgery in obese patients is more challenging as well as open surgery. Because a study published in 2017 has shown that the surgeon's experience in performing a laparoscopic hysterectomy plays a significant role in reducing complications, proper resident training to enable them to perform this procedure with an optimal safety even in obese patients is of paramount importance (28-31).

In conclusion, with the worldwide increase in obesity, and the consequent increase in gynecological conditions requiring hysterectomy in patients with high BMI, surgeons must become more familiar with the minimally invasive surgical management of obese patients. This will allow obese women to benefit from the reduced postoperative morbidity rate provided by the laparoscopic approach.

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