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Hysterectomy for Benign Indications in Obese Women: Laparoscopic or Abdominal Approach?

Obez Kadınlarda Bening Endikasyonlu Histerektomi: Laparoskopik mi, Abdominal mı?

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ABSTRACT

Aim: This study aimed to evaluate surgical outcomes associated with laparoscopic hysterectomy (LH) and abdominal hysterectomy (AH) in obese women.
Material and Methods: A retrospective review was conducted of obese women (body mass index, BMI, >30 kg/m^2) who underwent hysterectomy for benign indications between 2018 and 2022. Patients were divided into two groups based on surgical approach, LH and AH. Demographic characteristics, operative time, hospitalization day, and perioperative complications were compared.
Results: A total of 425 patients were included, comprising 146 (34.4%) AH and 279 (65.6%) LH cases. The groups were comparable in mean age (49.0±6.4 vs. 47.8±5.7 years, p=0.057), though BMI was significantly higher in the LH group (33.4±3.7 vs. 32.4±2.9 kg/m^2, p<0.001). The LH group demonstrated significantly shorter mean operative time (104.0±20.6 vs. 117.0±17.6 minutes, p<0.001) and also reduced median hospitalization day (2, range: 1-15, vs. 3, range: 2-14 days, p<0.001). The rate of intraoperative complications was comparable in both groups (n=5, 3.4% vs. n=2, 0.7%, p=0.050). However, a significantly higher postoperative complication rate was observed in the AH group (n=12, 8.2% vs. n=9, 3.2%, p=0.024).
Conclusion: LH in obese women was associated with shorter operative time, reduced hospitalization days, and lower rates of postoperative complications compared with AH. The overall findings suggest that LH is a safe and effective alternative to AH in obese patients. Further prospective studies are required to confirm these retrospective results and control for heterogeneity.
Keywords: Body mass index; hysterectomy; laparoscopy; obesity; surgical outcomes.

ÖZ

Amaç: Bu çalışmanın amacı, obez kadınlarda laparoskopik histerektomi (LH) ve abdominal histerektomi (AH) ile ilişkili cerrahi sonuçları değerlendirmektir.
Gereç ve Yöntemler: 2018 ve 2022 yılları arasında iyi huylu endikasyonlarla histerektomi geçiren obez kadınlar (vücut kitle indeksi, VKİ, >30 kg/m^2) geriye dönük olarak incelendi. Hastalar cerrahi yaklaşıma göre, LH ve AH olarak iki gruba ayrıldı. Demografik özellikler, operasyon süresi, hastanede kalış süresi ve perioperatif komplikasyonlar karşılaştırıldı.
Bulgular: Çalışmaya 146 (%34,4) AH ve 279 (%65,6) LH olgusu olmak üzere toplam 425 hasta dahil edildi. Gruplar ortalama yaş açısından benzerdi (49,0±6,4 ve 47,8±5,7 yıl, p=0,057), ancak VKİ, LH grubunda anlamlı derecede daha yüksekti (33,4±3,7 ve 32,4±2,9 kg/m^2, p<0,001). LH grubu anlamlı derecede daha kısa ortalama ameliyat süresi (104,0±20,6 ve 117,0±17,6 dakika, p<0,001) ve daha kısa ortanca hastanede kalış süresi (2, aralık: 1-15 ve 3, aralık: 2-14 gün, p<0,001) gösterdi. İntraoperatif komplikasyon oranı her iki grupta da benzerdi (n=5, %3,4 ve n=2, %0,7, p=0,050). Ancak AH grubunda anlamlı derecede daha yüksek bir postoperatif komplikasyon oranı gözlendi (n=12, %8,2 ve n=9, %3,2, p=0,024).
Sonuç: Obez kadınlarda LH, AH'ye kıyasla daha kısa ameliyat süresi, daha kısa hastanede kalış süresi ve daha düşük postoperatif komplikasyon oranları ile ilişkilendirilmiştir. Genel bulgular, LH'nin obez hastalarda AH'ye güvenli ve etkili bir alternatif olduğunu göstermektedir. Bu retrospektif sonuçları doğrulamak ve heterojenliği kontrol etmek için daha fazla prospektif çalışmalara ihtiyaç vardır.
Anahtar kelimeler: Vücut kitle indeksi; histerektomi; laparoskopi; obezite; cerrahi sonuçlar.

INTRODUCTION

Globally, the preponderance of overweight and obese adults has reached epidemic proportions, with approximately two in five adults now falling into these categories (1). This is a consequence of the high prevalence of obesity (2), and there is mounting concern regarding the long-term risks associated with obesity (1,2), as well as the risks associated with surgical procedures in obese women. Furthermore, it has been documented that approximately 40% of women who undergo hysterectomy in the United States are obese (3).

Historically, hysterectomy has been the most common non-obstetric surgical procedure among women (4). Laparoscopic hysterectomy (LH) is an appropriate surgical intervention for a diverse range of benign and malignant gynecological conditions (5). This approach is often preferred over laparotomic abdominal hysterectomy (AH). Moreover, previous studies have demonstrated that hysterectomies performed for benign indications in obese patients are associated with suboptimal surgical outcomes and an elevated incidence of surgical complications. These include prolonged operative time, excessive blood loss, increased risk of surgical site complications, and longer hospitalization days (3,5,6).

The surgical approach to the management of obese women presents a significant challenge. In an era of increasing obesity prevalence, it is of paramount importance to ascertain the optimal abdominal surgical approach for women with a body mass index (BMI) exceeding 30 kg/m^2. The aim of the present study, therefore, was to evaluate the surgical outcomes associated with laparoscopic and abdominal approaches in hysterectomies performed for benign indications in obese women.

MATERIAL AND METHODS

The present study was conducted retrospectively, and approval had initially been granted by the local ethics committee of Ankara Etlik Zübeyde Hanım Women's Health Training and Research Hospital (17.06.2022, 08). A detailed review of the surgical records was conducted to identify women who had undergone total hysterectomy for benign gynecological indications, either as a standalone procedure or in conjunction with salpingo-oophorectomy, between August 2018 and January 2022. The cohort of obese women who underwent LH and AH for benign indications at a single center was divided into two groups. The flow chart of the study's methodology is presented in Figure 1. The cases that were excluded from the study were as follows: hysterectomies performed for obstetric indications; cases with malignant definitive pathology; hysterectomies performed vaginally; cases converted from a laparoscopic to an abdominal approach; cases with concurrent additional surgeries (e.g., cholecystectomy, appendectomy, mid-urethral sling); and women with a BMI of less than 30 kg/m^2. All surgical procedures were carried out by the team within the gynecology department. A retrospective review of the hospital record system, patient files, and surgery notes was conducted. The following variables were identified: patient demographics, comorbidities, previous surgical histories, surgical and clinical notes, and intraoperative and postoperative outcomes. Furthermore, the change in hemoglobin (HB) was calculated as the difference between preoperative and first postoperative day values. The primary outcomes were operative time, hospitalization, HB change, transfusion rate, and intraoperative and postoperative poor outcomes. Secondary outcomes were reoperation within 30 days and the admission rate of the intensive care unit (ICU).

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics, version 29.0 (Armonk, NY: IBM Corp.). The Kolmogorov-Smirnov test was applied to assess the distribution of continuous variables. Data was expressed as mean±standard deviation, or median, 25th-75th percentile, minimum-maximum, depending on whether the distribution is normal or not. Between-group comparisons of continuous variables were performed using the independent samples t-test or the Mann-Whitney U test, as appropriate. Categorical variables were analyzed using the chi-squared or Fisher's exact test, depending on expected cell counts. A p-value<0.05 was considered statistically significant.

RESULTS

The present study comprised 425 cases, 34.4% (n=146) of whom were assigned to the AH group and 65.6% (n=279) to the LH group. The mean age of the two groups was found to be comparable (49.0±6.4 vs. 47.8±5.7, p=0.057). The LH group exhibited significantly higher BMI compared to the AH group (33.4±3.7 vs. 32.4±2.9, p<0.001). Furthermore, HB change was higher in the LH group than in the AH group (2.01±1.20 vs. 1.44±1.58 g/dl, p<0.001). In addition, the mean operative time (104.0±20.6 vs. 117.0±17.6 minutes, p<0.001) and median hospitalization day (2, range: 1-15 vs. 3, range: 2-14 days, p<0.001) were found to be lower in the LH group. The indications for hysterectomy are presented in Table 1.

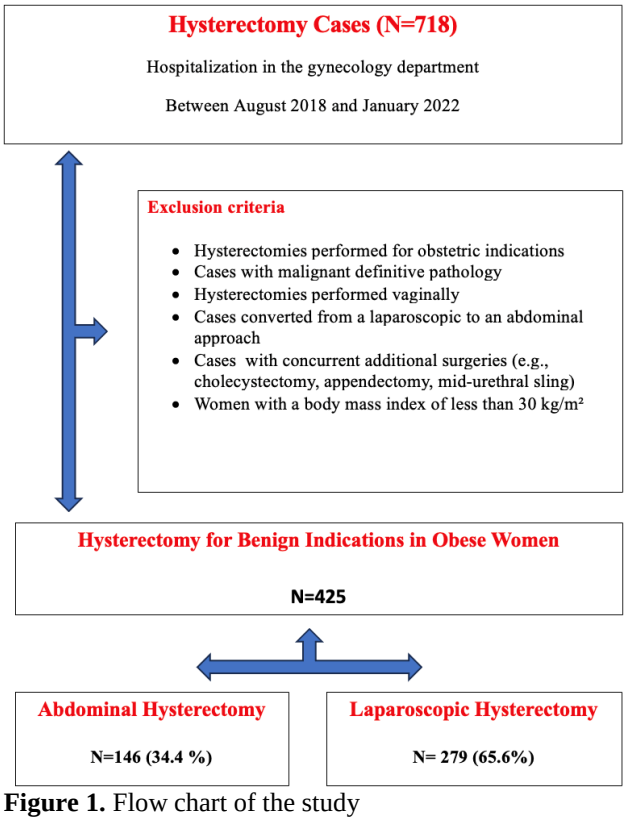


Figure 1. Flow chart of the study

Statistically significant differences were not identified between the groups with respect to the patients' previous history of surgical procedures related to obstetrics, gynecology, and the abdomen (Table 2). The prevalence of comorbidities, which could potentially impact surgical outcomes both intraoperatively and postoperatively, was comparable between the groups (Table 2).

The intra-abdominal adhesion was markedly elevated in the AH group (n=24, 16.4% vs. n=14, 5.0%, p<0.001). The intraoperative visceral organ injury was comparable in both groups (n=5, 3.4% vs. n=2, 0.7%, p=0.050). Two cases of bowel injury, two cases of ureter injury, and one case of bladder injury were identified in the AH group. In contrast, only two cases of bladder injury were observed in the LH group. In one case, AH was elected as the optimal course of action in view of the presence of a right adnexal mass (tubo-ovarian abscess) and uterine myoma, despite a week-long course of gentamicin-clindamycin; no clinical improvement was observed. However, intraoperative observation revealed a 2-mm ureteral injury 4 cm distal to the bladder, involving the right ureter. The primary repair was facilitated by the urology department, which inserted a right double-J catheter. In the other case of ureteral injury, a laceration of the left ureter was detected intraoperatively due to a large uterine myoma. Subsequent to the primary repair, the procedure was concluded with the utilization of a double-J catheter. In both cases, a complete cure was achieved with catheter removal one month later. Intraoperative observation revealed bowel and bladder injuries, which were subsequently addressed through primary surgical repair. The bowel injury was treated with an oral regimen, followed by subsequent follow-up. The bladder injuries were discharged with a Foley catheter and subsequently recalled for removal 10 days later, resulting in a cure.

The rates of wound/abdominal wall infection, vaginal cuff abscess, vaginal cuff bleeding or hematoma, early incisional hernia, thromboembolic event, positional nerve injury, ileus, and sepsis were found to be similar (Table 3). The prevalence of fever of unknown origin was markedly higher in the AH group (n=4, 2.7% vs. n=1, 0.4%, p=0.049). Three cases that underwent reoperation within 30 days were assigned to the AH group (two cases for early incisional hernia and one case for secondary suturation). In the LH group, the ICU admission was due to septic shock, whereas in the AH group, it was due to a pulmonary thromboembolism. The mortality rate was found to be negligible among the subjects in both groups.

DISCUSSION

This study indicates that, in obese women, LH is likely to offer several advantages over AH. These include a reduced length of hospitalization day and operative time, and fewer febrile episodes or unspecified infections. Moreover, the advantages of this approach include a lower rate of postoperative complications when compared with AH.

It is important to acknowledge that there are several approaches to hysterectomy, each of which has its own advantages and disadvantages. Therefore, to ensure optimal outcomes for patients, it is essential to determine the most efficacious procedure. This is further compounded by the variability of practice patterns, which can be influenced by the availability of information regarding the relative merits of different surgical approaches. A review of the database of the American College of Surgeons National Surgical Quality Improvement Program was conducted for 224357 patients undergoing elective hysterectomy for benign indications between 2007 and 2017. The results of the review revealed that LH rates have been steadily increasing over the past 11 years. This review revealed a marked discrepancy in the observed rates of change: whilst there was a more than 200% increase in LH rates, AH rates have been shown to decrease steadily by 42% (7).

Table 1. Comparison of the demographic, laboratory, and operative results of the groups

	AH (n=146)	**LH (n=279)**	**p**
Age (year)	47.8±5.7	49.0±6.4	0.057
BMI (kg/m^2)	32.4±2.9	33.4±3.7	**<0.001**
Gravida (n)	3 (2-4) [0-11]	3 (2-4) [0-9]	0.588
Parity (n)	3 (2-3) [0-7]	3 (2-3) [0-7]	0.614
Pre-operative WBC (x10^3/L)	7.7±2.4	7.1±1.8	**0.008**
Pre-operative HB (g/dl)	11.7±2.1	12.2±1.7	**0.024**
Post-operative WBC (x10^3/L)	10.8±3.5	10.4±3.2	0.305
Post-operative HB (g/dl)	10.3±1.4	10.1±1.4	0.443
HB Change (g/dl)	1.44±1.58	2.01±1.20	**<0.001**
ES Transfusion, n (%)	29.0 (19.9)	18.0 (6.5)	**<0.001**
Operative Time (min)	117.0±17.6	104.0±20.6	**<0.001**
Duration of Hospitalization (day)	3 (3-3) [2-14]	2 (2-2) [1-15]	**<0.001**
Indication for Hysterectomy, n (%)			
Uterine myoma	108 (74.0)	28 (10.7)	
Treatment-resistant uterine bleeding	15 (10.3)	72 (25.8)	
EH with or without atypia	5 (3.4)	91 (32.6)	
Adenomyosis	0 (0.0)	11 (3.9)	
Prophylaxis for BRCA	0 (0.0)	6 (2.2)	**<0.001**
Adnexal mass	17 (11.6)	23 (8.2)	
Cervical intraepithelial neoplasia	0 (0.0)	26 (9.3)	
Persistent postmenopausal bleeding	1 (0.7)	20 (7.2)	
Transsexualism	0 (0.0)	2 (0.7)	

AH: abdominal hysterectomy, LH: laparoscopic hysterectomy, BMI: body mass index, WBC: white blood cell, HB: hemoglobin, ES: erythrocyte suspension, EH: endometrial hyperplasia, BRCA: breast cancer, descriptive statistics are presented as mean±standard deviation, or as median (25^{th}-75^{th} percentile) [minimum-maximum]

Table 2. Comparison of the comorbidities and previous surgical history of the groups

	AH (n=146)	LH (n=279)	p
Abdominal Surgery, n (%)	52 (35.6)	83 (29.7)	0.217
Cesarean Section, n (%)	35 (22.4)	45 (16.1)	0.103
Abdominal Gynecological Surgery, n (%)	12 (8.2)	19 (6.8)	0.596
Abdominal Non-Gynecological Surgery, n (%)	15 (10.3)	40 (14.3)	0.236
Breast Cancer, n (%)	0 (0.0)	8 (2.9)	0.055
Hypertension, n (%)	21 (14.4)	56 (20.1)	0.148
Diabetes Mellitus, n (%)	10 (6.8)	35 (12.5)	0.070
Respiratory Disease, n (%)	7 (4.8)	11 (3.9)	0.679
Thyroid Disease, n (%)	15 (10.3)	8 (2.9)	**0.001**

AH: abdominal hysterectomy, LH: laparoscopic hysterectomy

Table 3. Comparison of the presence of intraoperative and postoperative outcomes of the groups

	AH (n=146)	LH (n=279)	p
Concomitant Salpingo-Oophorectomy, n (%)			
BS	59 (40.4)	68 (24.4)	0.002
BSO	75 (51.4)	188 (67.4)	
USO	12 (8.2)	23 (8.2)	
Intra-Abdominal Adhesion, n (%)	24 (16.4)	14 (5.0)	**<0.001**
Frozen Section Diagnosis, n (%)	36 (24.7)	52 (18.6)	0.146
Intraoperative Complications, n (%)	5 (3.4)	2 (0.7)	**0.050**
Bowel Injury	2 (1.4)	0 (0.0)	
Ureter Injury	2 (1.4)	0 (0.0)	0.052
Bladder Injury	1 (0.7)	2 (0.7)	
Postoperative Complications, n (%)	12 (8.2)	9 (3.2)	**0.024**
Wound/Abdominal Wall Infection	4 (2.7)	7 (2.5)	0.887
Fever of Unknown Origin	4 (2.7)	1 (0.4)	**0.049**
Vaginal Cuff Abscess	1 (0.7)	2 (0.7)	0.970
Vaginal Cuff Bleeding or Hematoma	1 (0.7)	2 (0.7)	0.970
Early Incisional Hernia	2 (1.4)	0 (0.0)	0.117
Thromboembolic Event	1 (0.7)	0 (0.0)	0.344
Positional Nerve Injury	0 (0.0)	1 (0.4)	0.656
Ileus	1 (0.7)	1 (0.4)	0.570
Sepsis	0 (0.0)	1 (0.4)	0.656
Re-hospitalization, n (%)	7 (4.8)	15 (5.4)	0.797
Re-operation, n (%)	3 (2.1)	0 (0.0)	**0.040**
Intensive Care Unit, n (%)	1 (0.7)	1 (0.4)	0.570

AH: abdominal hysterectomy, LH: laparoscopic hysterectomy, BS: bilateral salpingectomy, BSO: bilateral salpingo-oophorectomy, USO: unilateral salpingo-oophorectomy

Moreover, the process of hysterectomy in cases of obesity is viewed as more intricate due to the inherent challenges associated with identifying and navigating through the relevant anatomical landmarks. This is in addition to the necessity for a more extensive surgical field and the narrower dimensions of the pelvic region (8). Notwithstanding the intrinsic challenges associated with performing a hysterectomy on obese patients, it is imperative to employ a team of highly skilled surgeons, select the most optimal surgical approach, and facilitate close collaboration with anesthesiologists to ensure optimal outcomes. This is particularly crucial in light of the increased prevalence of comorbidities in this demographic (3,8). In this study, both groups exhibited comparable rates of comorbidities and previous abdominal surgery histories that could potentially influence surgical outcomes.

The 2023 Cochrane database indicates that LH is likely to offer several advantages over AH for benign hysterectomies, including a potential reduction in operative blood loss, an accelerated recovery period, a lower incidence of febrile episodes, a decreased likelihood of wound or abdominal wall infections, and a reduced necessity for blood transfusions. These benefits are associated with an extended operative time and an elevated risk of ureteral injury (9). A study that evaluated 2266 patients with LH found that laparoscopic surgery for hysterectomy is a secure option for obese women, irrespective of their BMI, and demonstrated that obesity does not preclude favorable surgical outcomes (10). Furthermore, a systematic review revealed that both LH and VH were linked to a reduced incidence of postoperative complications and a shorter hospitalization day compared to AH in patients with severe obesity (5).

Intra-abdominal adhesions have been demonstrated to have a significant impact on the necessity for conversion to laparotomy, with rates of up to 8.8% being observed among laparoscopic surgery cases (11). Furthermore, an increased level of surgical complexity and extended operating times are significant factors in the occurrence of readmissions after laparoscopic surgery (11,12). However, Wang et al. (12) observed that robotic total hysterectomies (RTH) with pelvic adhesions exhibited an increase in operative time compared to cases without adhesions. Notably, there was no significant increase in blood loss, intra- or post-operative complications, or length

of hospitalization day in the adhesion group (11). However, the present study revealed that the AH group exhibited a significantly higher rate of adhesions (16.4% vs. 5.0%). Furthermore, the AH group demonstrated a higher rate of postoperative complications. The study comprised 328 obese women who underwent both AH and LH, and the incidence of perioperative, early postoperative, mid-term postoperative, and late postoperative complications was found to be comparable in both groups (13). Furthermore, no significant discrepancy was observed in the incidence of these complications across the various BMI categories.

Agarwal et al. (14) found that the rate of surgical site infection (SSI) was higher in the AH group than in the LH group (82.4% vs. 17.6%). However, in our study, the rate of wound/abdominal wall infection and vaginal cuff abscess was comparable in both groups. The fever of unknown origin rate was higher in the AH group (2.7% vs. 0.4%). In a similar vein, Agarwal et al. (14) observed that the operative time (75±25 vs. 128±52 min) and mean blood loss (110±30 vs. 160±116 ml) were markedly higher in the AH group. Furthermore, a significant decrease in the duration of hospitalization day was observed in the LH group (4.0±2.5 vs. 7.0±2.4 days).

Lim et al. (15) evaluated the risk factors for conversion to AH compared to LH and RTH, and conversion to laparotomy was identified in 3.93% of cases. The study concluded that obesity represents a risk factor for conversion to AH. In five cases not included in the present study, the laparoscopic intervention was converted to an abdominal intervention, due to the presence of adhesions in three cases, and due to the results of a malignant frozen section in one case. In another case, a gastric injury occurred via trocar during laparoscopic intervention initially, necessitating conversion to abdominal intervention for repair of the gastric injury, and then a hysterectomy with AH. The conversion rate from LH to AH in obese women in our clinic was determined to be 0.01% (5/430).

A recent study has revealed that the weighted pooled mean rates for bladder and ureteral injury were found to be 212-997 and 9-577 events per 100000 hysterectomies for all approaches and all pathologies (16). Additionally, the incidence of bowel injuries has been reported to be less than 1% in laparoscopic procedures (17). In contrast, Balcı O. (18) reported a higher prevalence of urinary tract injuries in LH compared to AH, though no significant discrepancy was observed in other visceral organ injuries. Conversely, Maccio et al. (19) revealed that intraoperative and postoperative complications, as well as hospitalization days, did not exhibit any notable discrepancy by uterine weight in LH cases. This study showed no significant difference in intraoperative visceral organ injury rates between the two groups of obese women.

Myomas were among the most common indications for hysterectomy and were often associated with a larger uterine size, which may influence the choice of surgical method (20). Some studies have reported an increase in surgical difficulty with increasing uterine weight, thus suggesting that uterine weight has an impact on operative time (21), intra- and postoperative adverse events (22). This may provide a rationale for the increased operative times observed in the AH group in our study. Consequently, the preponderance of myoma indications in the abdominal group, in conjunction with the ensuing uterine enlargement, is likely to have contributed to the protraction of operative times and the impracticability of comparing perioperative outcomes between approaches. However, other studies have found that minimally invasive approaches (LH and RTH) were both feasible and safe for patients, regardless of uterine weight, and result in reduced blood loss, a shorter hospitalization day (23), minimal operative time, and a lower complication rate (24).

The study's key strengths are its single-center, tertiary-care setting and its inclusion of a sufficiently large cohort of hysterectomies performed for benign gynecological indications in obese patients. Additionally, the study's homogeneous distribution of comorbidities and previous surgical history, which can influence surgical outcomes, further enhances its internal validity. The present study is subject to several limitations. Firstly, the retrospective design of the study carries an inherent risk of selection bias and unmeasured confounding. This is because the selection of surgical approach and the collection of data were not randomized or prospectively standardized. Secondly, the possibility of missing or incomplete data cannot be excluded, which may have affected the accuracy of some perioperative variables. Thirdly, as previously stated, surgical indications were not homogeneous across groups; the predominance of myoma-related cases in the AH group may have introduced additional bias, particularly about operative time and complications. Finally, the single-center study may limit the generalizability of the findings. To confirm these results, further multicenter studies are required, with standardized data collection methodologies.

CONCLUSION

Despite the higher BMI of the LH group in this study, the laparoscopic approach was found to be the preferred and favorable method for hysterectomies in obese women in comparison to the open abdominal approach. In the case of obese women, the approach of LH was found to be associated with a reduced operative time, a decreased number of postoperative hospitalization days, and a lower incidence of complications in comparison with the approach of AH. Further randomized controlled trials are warranted to both validate these retrospective results and control for heterogeneity in surgical indications.

Ethics Committee Approval: The study was approved by the Ethics Committee of the Etlik Zübeyde Hanım Women's Health Training and Research Hospital (17.06.2022, 08).

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