Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Risk of Hysterectomy Following Endometrial Ablation: A 10-Year Retrospective Analysis

Amy Hackett

amyhackettmd@gmail.com

Yale New Haven Health

Colleen Murphy

Yale New Haven Health

Lisbet Lundsberg

Yale New Haven Health

Mitchell Clark

Yale New Haven Health

Mecca Johnson-Murray

Yale New Haven Health

Research Article

Keywords: abnormal uterine bleeding, hysteroscopy, treatment failure, obesity, adenomyosis

Posted Date: November 6th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11106950/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Purpose

This study assessed indication for hysterectomy following failed endometrial ablation and identified risk factors for therapy failure.

Methods

A retrospective cohort study of 1054 patients undergoing endometrial ablation from January 1, 2011, to January 1, 2021, within the Yale New Haven Health system was conducted using chi-square and ANOVA tests. No interventions were made in this study.

Results

The hysterectomy rate amongst endometrial ablation patients was 18% (n = 190). Each additional year post ablation decreased the risk of subsequent hysterectomy by 5% (aHR 0.95, $p < .05$). Patients with BMI of 30-39.9 had a 61% increased risk of subsequent hysterectomy (aHR 1.61, $p = .003$), and a BMI ≥ 40 had a 108% increased risk (aHR 2.08, $p = .002$). A history of diabetes showed a nonsignificant trend toward increased risk of hysterectomy (aHR 1.44, $p = 0.09$). The primary indication for hysterectomy after ablation was persistent AUB (68.9%). The primary uterine pathology identified at time of hysterectomy was leiomyoma (61.1%).

Conclusion

Endometrial ablation has become a popular choice for treatment of abnormal uterine bleeding given its minimally invasive nature and cost-effectiveness. This study demonstrated 1 in 5 women will require hysterectomy post ablation. Risk factors including younger age, presence of leiomyoma or adenomyosis, and obesity, can increase patient's risk of requiring hysterectomy for management. There was no significant difference in parity, race-ethnicity, history of hypertension, diabetes, or smoking, within the two cohorts. These findings can be used to enhance patient counseling and selection of appropriate candidates for endometrial ablation.

What Does This Study Add to the Clinical Work

This retrospective cohort study found that approximately one in five patients that undergo endometrial ablation subsequently underwent hysterectomy. Younger age and obesity were associated with increased risk of post-ablation hysterectomy, providing clinically relevant information for patient selection and preoperative counseling.

Introduction

Abnormal uterine bleeding (AUB) is a common condition in pre-menopausal people with uteruses and is defined as bleeding abnormal in frequency, duration, volume, and/or regularity [1]. One third of outpatient gynecologic visits address AUB, and more than 70% of gynecologic consults in menopausal and peri-menopausal women are for AUB [2]. A 2015 European survey of over 4500 women found over half of patients with AUB reported negative impact of their symptoms on their sexual life, physical activities and productivity at work [3].

After appropriate work up and diagnosis, first line treatment involves medical management with agents such as oral contraceptives, levonorgestrel-IUD (LNG-IUD), and tranexamic acid (TXA) [1]. If patients fail medical management, minimally invasive surgical management options include endometrial ablation and hysterectomy.

Endometrial ablation is a minimally invasive surgical alternative to hysterectomy and may be selected due to less strenuous post-operative recovery or for patients who desire retaining their uterus. The procedure aims to destroy the endometrial layer of the uterus and thereby disrupt menstruation through the use of coagulation, lasers, or loop resection [4]. Absolute contraindications to endometrial ablation include endometrial hyperplasia or carcinoma, current pregnancy, desire to preserve fertility, acute pelvic infection, and current use of intrauterine device (IUD). Published rates of hysterectomy after failed ablation varies considerably in the literature, ranging from 4–25%. [5, 6, 7, 11].

The purpose of this study is to assess the long-term risk of hysterectomy after ablation, and to identify risk factors for patients who may fail endometrial ablation to improve pre-operative counseling and shared decision-making regarding management options for AUB.

Methods

This was a single health system, retrospective cohort study approved by the Institutional Review Board (IRB) at Yale New Haven Health (New Haven, CT). Patients were included in the study who received endometrial ablation for abnormal uterine bleeding between January 1, 2011, to January 1, 2021, within the Yale New Haven Health system. The surgeries were conducted at the four main hospitals and various outpatient surgery centers within the health system.

Patients were identified for inclusion using Current Procedural Terminology codes for endometrial ablation. Chart abstraction was then performed to collect demographics and clinical characteristics on all patients who met inclusion criteria, including subsequent hysterectomy, age at time of ablation, race-ethnicity, BMI, history of hypertension, history of diabetes, history of smoking, and parity.

For patients who underwent subsequent hysterectomy, further chart abstraction was performed to identify primary indication for hysterectomy and uterine histopathology identified at time of hysterectomy.

Statistical analysis: Bivariate tests of association between patient attributes and failed ablation were conducted using chi-square test and ANOVA as appropriate. Kaplan-Meier curves and log rank tests were examined to evaluate time to event across measures. Cox proportional hazard regression modeling was performed including patient attributes significant in bivariate analyses at $p < .10$. Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) are presented. Indication for hysterectomy and uterine pathology among patients with failed ablation is presented using descriptive statistics.

Results

From January 2011 to January 2021, 1054 patients who underwent an endometrial ablation within the Yale New Haven Health system were identified for inclusion in the study. Among the patients who received endometrial ablation, 18% (n = 190) underwent hysterectomy after ablation.

The mean age for patients who underwent hysterectomy after ablation was 42.9 years (SD 5.7). The mean age for patients who did not undergo hysterectomy after ablation was 44.6 years (SD 5.3). Patients who were older at time of ablation were less likely to require hysterectomy in future. Each additional year of age at the time of ablation decreased the risk of subsequent hysterectomy by 5% (adjusted hazard ratio [aHR] 0.95, $p<.05$). Patients In both cohorts, most patients were White, non-Hispanic (no hysterectomy, n = 610; hysterectomy n = 132), followed by Hispanic (no hysterectomy, n = 106; hysterectomy n = 22), Black, non-Hispanic (no hysterectomy, n = 103; hysterectomy n = 33), and Asian or other, non-Hispanic populations (no hysterectomy n = 45; hysterectomy n = 3) (Table 1).

Table 1
Characteristics of patients who received endometrial ablation vs those who failed endometrial ablation with subsequent hysterectomy, n(%)

Patient characteristic	No hysterectomy (N = 864)	Hysterectomy (n = 190)	p-value
Age, < 45 years	430 (49.8)	123 (64.7)	.0002
Age, mean (SD) years	44.6 (5.3)	42.9 (5.7)	.0001
Race-ethnicity			.04
Hispanic	106 (12.3)	22 (11.6)	
White, non-Hispanic	610 (70.6)	132 (69.5)	
Black, non-Hispanic	103 (11.9)	33 (17.4)	
Asian or other, non-Hispanic	45 (5.2)	3 (1.6)	
BMI			.003
<30	481 (55.9)	77 (40.53)	
30 < 40	312 (36.2)	88 (46.3)	
40+	68 (7.9)	25 (13.2)	
Hypertension history	264 (30.6)	61 (32.1)	.68
Diabetes history	72 (8.3)	26 (13.7)	.02
Smoking history	256(29.6)	50 (26.3)	.36
Parity			.76
0	24 (12.6)	126 (14.6)	
1	25 (13.2)	108 (12.5)	
2	85 (44.7)	356 (41.2)	
3+	56 (29.5)	274 (31.7)	

Within the no hysterectomy cohort, 55.9% (n = 481) had BMI of less than 30, 36.2% (n = 312) had a BMI of 30 to 40, and 7.9% (n = 68) had a BMI of greater than 40. Within the hysterectomy cohort, 40.5% (n = 77) had a BMI less than 30, 46.3% (n = 88) had a BMI of 30 to 40, and 13.2% (n = 25) had a BMI of greater than 40.

A history of hypertension was present in 30.6% (n = 264) of patients within the no hysterectomy group, and present in 32.1% (n = 61) of patients in the hysterectomy group. A history of diabetes was present in 8.3% (n = 72) of patients within the no hysterectomy group, and present in 13.7% (n = 26) of patients in the hysterectomy group. A history of smoking was present in 29.6% (n = 256) of patients within the no hysterectomy group, and present in 26.3% (n = 50) of patients in the hysterectomy group. Patients in both

categories were stratified by parity of 0,1,2 or more than 3. There was no significant difference in parity amongst the cohorts.

Patients with a BMI of 30-39.9 had a 61% increased risk of subsequent hysterectomy (aHR 1.61, p=.003), and those with a BMI ≥ 40 had a 108% increased risk of subsequent hysterectomy (aHR 2.08, p=.002). Patients with a history of diabetes demonstrated a non-significant trend toward increased risk of hysterectomy was observed (aHR 1.44, p = 0.09). No significant associations were found for race/ethnicity, parity, hypertension, or smoking history (Table 2).

Table 2
Final proportional hazards model of patient attributes and failed endometrial ablation

Patient attributes	**aHR (95% CI)**	**p-value**
Age (continuous in years)	0.95 (0.93–0.98)	.0001
BMI		
<30	Ref	
30–40	1.61 (1.17–2.19)	.003
40+	2.08 (1.31–3.29)	.002
Diabetes history	1.44 (0.95–2.20)	.09
Race-ethnicity		
Hispanic	0.84 (0.53–1.32)	.45
White, non-Hispanic	Ref	
Black, non-Hispanic	1.16 (0.78–1.71)	.46
Asian or other, non-Hispanic	0.31 (0.10–0.98)	.046
aHR, adjusted hazard ratio		
*Total *n* = 1051 due to missing observations		

The primary indication for hysterectomy after ablation was persistent abnormal uterine bleeding (68.9%), followed by pelvic pain or post-ablation pain syndrome (36.3%), endometrial hyperplasia (4.2%), endometrial malignancy (1.1%) and other indications (9.5%). (Fig. 1). The primary uterine pathology identified at time of hysterectomy was leiomyoma (61.1%), followed by adenomyosis (47.4%), endometrial polyp (4.2%), endometrial hyperplasia (2.1%), endometrial carcinoma (1.1%), and endometriosis (0.5%) (Fig. 2.)

Discussion

1054 patients within a single health system, across multiple hospitals, were identified over a 10-year period to have received an endometrial ablation. 18% of these patients went on to receive a hysterectomy. A systematic review published by Matteson et al. [8] demonstrated significant variations in rates of hysterectomy following ablation, with some studies approaching 30%. Various other studies have evaluated the rate of hysterectomy, ranging between 10–25% [9, 10, 11]. Cooper et al. [9] discuss the difficulty of evaluating true rates of hysterectomy after ablation with retrospective analysis due to inevitable loss of follow up from patient's changing practice outside of the health system. Similarly, there is a possibility the rate is also variable within this study's population. This scenario is likely a confounding factor in many other retrospective or meta-analysis, and could be better evaluated in a large, multicenter long-term prospective study following patients after ablation.

It is well documented in previous literature that younger age is a risk factor for failed ablation [4, 11]. Shavell et al. [4] noted a significant increase in rate of hysterectomy in the youngest quartile of women in the study (21–36 years) was 20.8%, which was nearly double the rate in the oldest quartile (> 47 years). We found that with each increased year of age at the time of ablation, the risk of hysterectomy decreased by 5%, independent of other variables (adjusted hazard ratio [aHR] 0.95, p<.05). This is a significant finding that should be considered when counseling patients regarding use of ablation for AUB, particularly in younger patients.

We also found that patients with obesity are 1.6-2 times more likely to fail endometrial ablation (BMI 30 < 40: aHR 1.61 (CI 1.17–2.19, p .003; BMI 40+: aHR 2.08 (CI 1.31–3.29, p .002) compared to non-obese patients. This finding may be explained by the increased estrogen state in patients with elevated BMI, and therefore it can be hypothesized that an endometrial ablation is less likely to overcome the increased estrogen, leading to increased risk in hysterectomy. Beelen et al. [19] performed a meta-analysis study reviewing prognostic factors that may lead to re-intervention after endometrial ablation. Seven studies were identified that discussed obesity, with one study linking a BMI > 30 to increased rates of intervention. The other six studies did not find a correlation. Our data adds to the limited previously published literature and demonstrates a correlation with increased BMI and failure of ablation, warranting the need to further review this characteristic on a larger scale.

A co-morbidity of diabetes mellitus (type 1 or type 2) demonstrated a non-significant increased risk of failing endometrial ablation by 44% (aHR 1.44 (CI 0.95–2.20, p .09). This risk factor has not been previously reported in the literature. This may be explained by poor wound-healing that occurs within diabetic populations, that may not allow for sufficient healing of the ablated endometrial cavity and lead to subsequent breakthrough bleeding. While this finding was not statistically significant within this study, there does appear to be a potential correlation that can be an area of future exploration for future studies.

Of note, there was no significant association noted between race-ethnicity, parity, history of hypertension, or history of smoking cohorts that changed the risk of failed endometrial ablation.

Regarding uterine pathology noted at the time of hysterectomy, most patients demonstrated a presence of leiomyomas (69%). This is an increase in previously reported rate of 49% by Carey et al [13]. However, it is estimated that up to 70% of women will have leiomyomas by the time of menopause [14]. Leiomyomas are also the most common indication for hysterectomy [15, 16]. The rate of leiomyoma present at time of hysterectomy in this study is consistent with suspected prevalence of leiomyoma in the general population, and therefore likely does not inherently increase the risk of failing endometrial ablation. Future studies may be beneficial in evaluating burden of leiomyoma, size of leiomyoma and type of leiomyoma to determine if these characteristics influence the risk of failing endometrial ablation.

Adenomyosis was present in the uterine pathology of 47.4% of patients who underwent hysterectomy, consistent with a rate of 44.4% reported by Shavell et al. [4], though increased in frequency than the rate of 28% reported by Carey et al [13]. The prevalence of adenomyosis in pre-menopausal women overall is uncertain due to historic reliance on diagnosis based on evaluation of uterine specimens, typically done at time of hysterectomy [17]. Upson et al. [18] report an estimated prevalence of adenomyosis for the past 50 years has ranged from 8.8–61.5%. In this population approximately half of patients demonstrated signs of adenomyosis, therefore we cautiously suspect this is a risk factor that leads to endometrial ablation failure. As imaging modalities such as ultrasound and MRI improve and lead to diagnosis of adenomyosis prior to time of tissue evaluation, true prevalence may be better understood and can be evaluated further in relation to ablation efficacy.

The primary indication for hysterectomy for patients who failed endometrial ablation in this study was AUB (68.9%). This illustrates that the vast majority of patients who subsequently underwent hysterectomy did not experience a long-term alleviation of the symptoms that had led them to seeking endometrial ablation for management of AUB. A significant proportion of patients presented with pelvic pain or documented “post-ablation pain syndrome” (36.3%). This should be considered a potential risk factor for endometrial ablation failure, particularly for patients who initially present with both AUB and pelvic pain.

The major limitation of this study is the identification of patients from a single-institution population. However, the procedures were performed across different hospitals and outpatient surgery centers across the state of Connecticut, New York, and Rhode Island and by different types of providers including general OB-GYNs, minimally invasive gynecologic surgeons, private practice and academic faculty which lends to diversification of the population and outcomes that make the findings more generalizable. Within this study population, previously described risk factors were confirmed and findings such as a link of obesity and potential link of diabetes mellitus were identified that can lead to further study across multiple institutions or using a national database.

In conclusion, endometrial ablation has become a popular choice for treatment of abnormal uterine bleeding, given its minimally invasive nature and cost-effectiveness. When counseling patients for treatment with endometrial ablation, it is important to inform them of the risk of treatment failure and the need for hysterectomy. This study demonstrated an overall rate of 18% of hysterectomy, indicating in

this institution's population 1 in 5 women will likely require further management with hysterectomy. This study also demonstrated risk factors such as younger at time of hysterectomy, presence of leiomyoma or adenomyosis uterine pathology, obesity, and non-significant correlation of history of diabetes that can increase patient's risk of requiring hysterectomy for management. There was no significant difference in parity, history of hypertension, history of smoking, or race-ethnicity within the two cohorts.

These findings can be used to enhance patient counseling and selection of appropriate candidates for endometrial ablation.

Declarations

Competing Interests:

The authors have no relevant financial or non-financial interests to disclose.

Consent to Participate:

The requirement for informed consent was waived by the Yale New Haven Health Institutional Review Board due to the retrospective nature of the study.

Consent to Publish:

Not applicable

Ethics approval:

This study was marked exempt by the Yale New Haven Health Institutional Review Board on August 24, 2022.

Funding:

The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

Author Contribution

Hackett: Corresponding author. Study design and development. Data extraction and management. Statistical analysis. Manuscript authorship, editing and review.Murphy: Study design and development. Manuscript editing and review. Statistical analysis.Lundsberg: Statistical analysis. Manuscript authorship, editing and review.Clark: Project development, senior author.Johnson-Murray: Data collection and management, abstract writing and editing, manuscript review and editing.

Data Availability

Data was extracted from Yale New Haven Health Database, saved in HIPAA compliant file within YNHH system, and is available for review.

References

1. Lebduska E, Beshear D, Spataro BM. Abnormal Uterine Bleeding. Med Clin North Am. 2023; https://doi.org/10.1016/j.mcna.2022.10.014
2. Spencer CP, Whitehead MI. Endometrial assessment revisited. Br J Obstet Gynaecol 1999; 106:623–32; https://doi.org/10.1111/j.1471-0528.1999.tb08358.x
3. Fraser IS, Mansour D, Breymann C, Hoffman C, Mezzacasa A, Petraglia F. Prevalence of heavy menstrual bleeding and experiences of affected women in a European patient survey. Int J Gynaecol Obstet. 2015; 128:196–200; https://doi.org/10.1016/j.ijgo.2014.09.027
4. Shavell VI, Diamond MP, Senter JP, Kruger ML, Johns DA. Hysterectomy subsequent to endometrial ablation. J Minim Invasive Gynecol. 2012; 19:459 – 64; https://doi.org/10.1016/j.jmig.2012.03.013
5. Lethaby A, Hickey M, Garry R, Penninx J. Endometrial resection / ablation techniques for heavy menstrual bleeding. Cochrane Database Syst Rev. 2009; https://doi.org/10.1002/14651858.CD001501.pub3
6. Beelen P, van den Brink MJ, Herman MC, Geomini PMAJ, et al. Levonorgestrel-releasing intrauterine system versus endometrial ablation for heavy menstrual bleeding. Am J Obstet Gynecol. 2021; 224:187; https://doi.org/10.1016/j.ajog.2020.08.016
7. Kalampokas E, McRobbie S, Payne F, Parkin DE. Long-term incidence of hysterectomy following endometrial resection or endometrial ablation for heavy menstrual bleeding. Int J Gynaecol Obstet. 2017; 139:61–64; https://doi.org/10.1002/ijgo.12259
8. Matteson KA, Abed H, Wheeler TL 2nd, et al. Society of Gynecologic Surgeons Systematic Review Group. A systematic review comparing hysterectomy with less-invasive treatments for abnormal uterine bleeding. J Minim Invasive Gynecol. 2012; 19:13–28; https://doi.org/10.1016/j.jmig.2011.08.005
9. Cooper K, Lee A, Chien P, Raja E, Timmaraju V, Bhattacharya S. Outcomes following hysterectomy or endometrial ablation for heavy menstrual bleeding: retrospective analysis of hospital episode statistics in Scotland. BJOG. 2011; 118:1171–9; https://doi.org/10.1111/j.1471-0528.2011.03011.x
10. Dickersin K, Munro MG, Clark M, et al. Surgical Treatments Outcomes Project for Dysfunctional Uterine Bleeding (STOP-DUB) Research Group. Hysterectomy compared with endometrial ablation for dysfunctional uterine bleeding: a randomized controlled trial. Obstet Gynecol. 2007; 110:1279–89; https://doi.org/10.1097/01.AOG.0000292083.97478.38
11. Oderkerk TJ, Beelen P, Bukkems ALA, et al. Risk of Hysterectomy After Endometrial Ablation: A Systematic Review and Meta-analysis. Obstet Gynecol. 2023; 142:51–60. https://doi.org/10.1097/AOG.0000000000005223

12. Smithling KR, Savella G, Raker CA, Matteson KA. Preoperative uterine bleeding pattern and risk of endometrial ablation failure. Am J Obstet Gynecol. 2014; 211: 556; https://doi.org/10.1016/j.ajog.2014.07.005
13. Carey ET, El-Nashar SA, Hopkins MR, Creedon DJ, Cliby WA, Famuyide AO. Pathologic characteristics of hysterectomy specimens in women undergoing hysterectomy after global endometrial ablation. J Minim Invasive Gynecol. 2011; 18:96 – 9; https://doi.org/10.1016/j.jmig.2010.10.004
14. Stewart EA, Cookson CL, Gandolfo RA, Schulze-Rath R. Epidemiology of uterine fibroids: a systematic review. BJOG 2017; 124:1501–12; https://doi.org/10.1111/1471-0528.14640
15. Wright JD, Herzog TJ, Tsui J, et al. Nationwide trends in the performance of inpatient hysterectomy in the United States. Obstet Gynecol 2013; 122:233–41; https://doi.org/10.1097/AOG.0b013e318299a6cf
16. Stewart EA. Clinical practice. Uterine fibroids. N Engl J Med. 2015; 372: 1646–55; https://doi.org/10.1056/NEJMcp1411029
17. Seidman JD, Kjerulff KH. Pathologic findings from the Maryland Women's Health Study: practice patterns in the diagnosis of adenomyosis. Int J Gynecol Pathol. 1996; 15:217 – 21; https://doi.org/10.1097/00004347-199607000-00005
18. Upson K, Missmer SA. Epidemiology of Adenomyosis. Semin Reprod Med. 2020; 38:89–107; https://doi.org/10.1055/s-0040-1718920
19. Beelen P, Reinders IMA, Scheepers WFW, et al. Prognostic Factors for the Failure of Endometrial Ablation: A Systematic Review and Meta-analysis. Obstet Gynecol. 2019; 134:1269–1281; https://doi.org/10.1097/AOG.0000000000003556

Figures

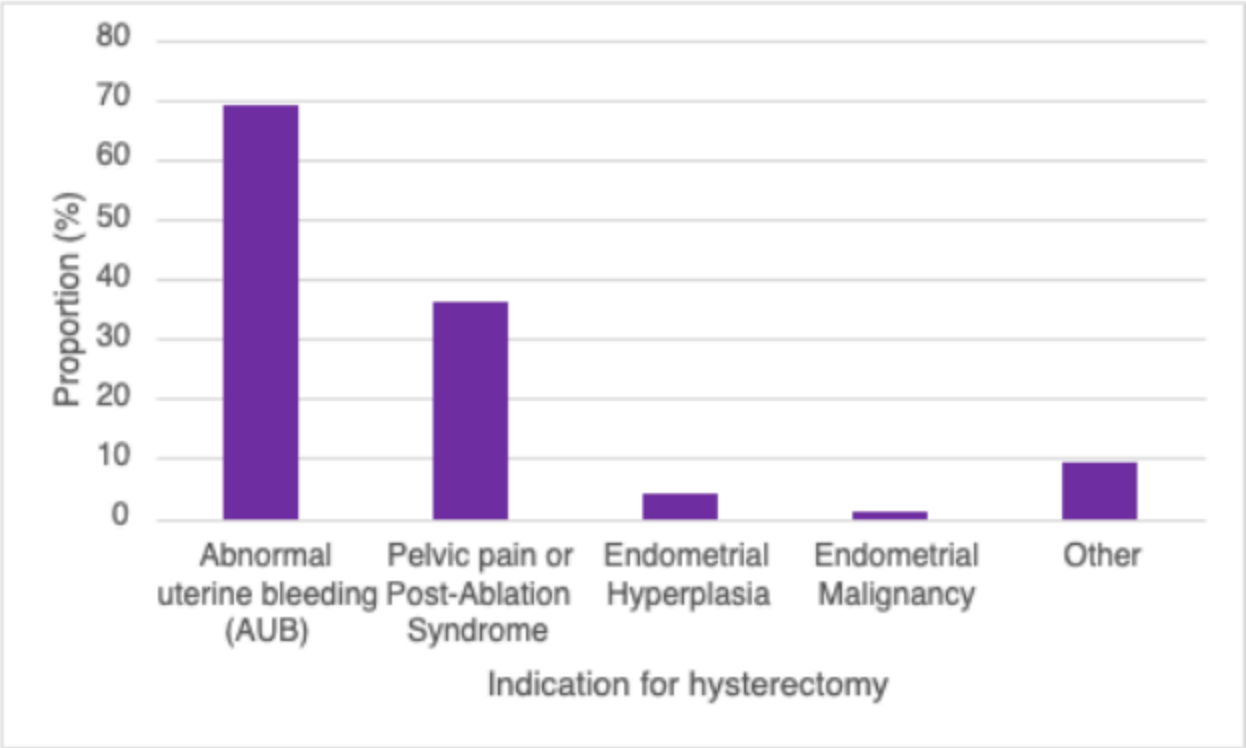


Figure 1

Analysis of primary indication for hysterectomy after failed endometrial ablation (n=190)

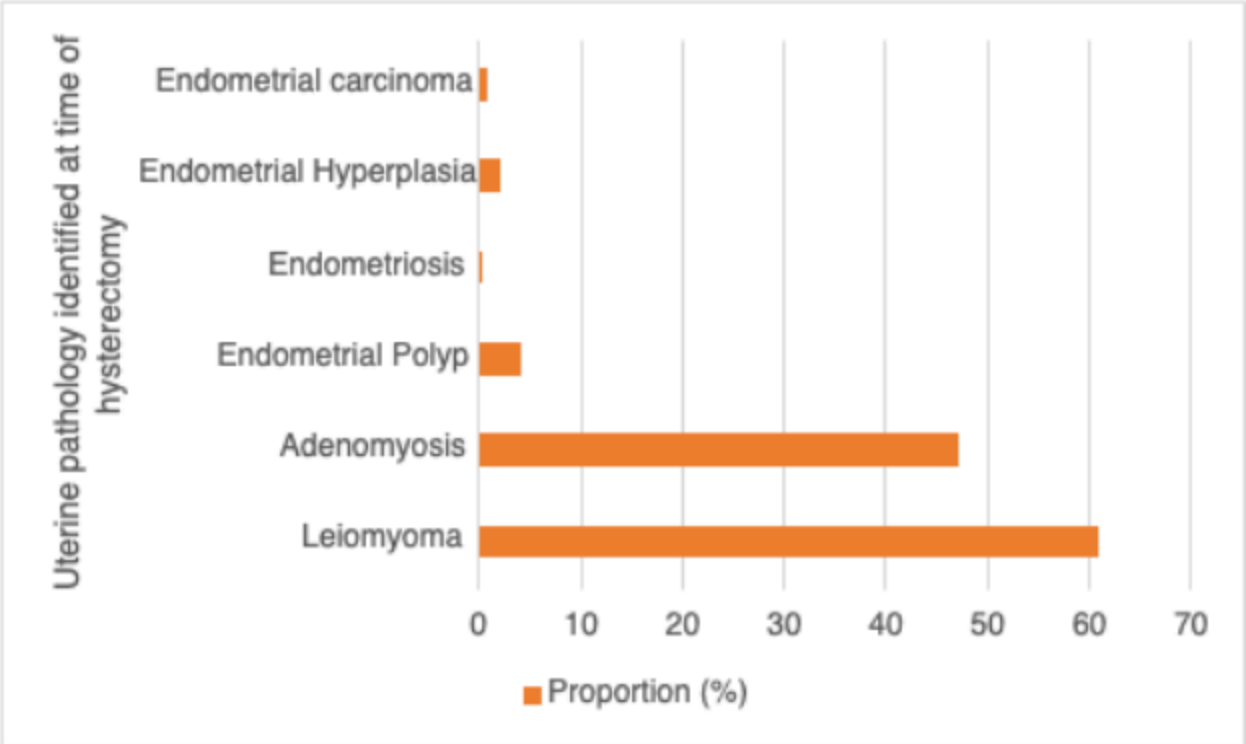


Figure 2

Analysis of uterine pathology identified at time of hysterectomy (n=190)