



Hypertension Improvement Following total Abdominal Hysterectomy in Women with Adenomyosis: A Prospective Cohort Study

Corresponding Author: Azal Sadiq Dawood*

Obstetrics and Gynecology Department, College of Medicine, University of Diyala, Iraq

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ABSTRACT:

Background: Adenomyosis is gynecological uterine disease that is increasingly common among women of reproductive age and characterized by its association with an increased potential of high blood pressure. This study was prepared to evaluate the improvement of hypertension in women with adenomyosis following abdominal total hysterectomy.

Methods: The prospective cohort study involved (110) patients with adenomyosis underwent total abdominal hysterectomy, (76) of whom had a history of hypertension, in private hospitals in Diyala Governorate, Iraq, between February and October 2025. Then, after six months of post-operative follow-up, changes in blood pressure readings and medication dosages were assessed.

Results: It was observed that 54 women (71.1%) experienced remarkable improvement in their blood pressure levels, with 35 (64.8%) showing clinical improvement and 19 (35.2%) achieving complete or normal blood pressures, associated with younger age, had hypertension for less than two years, not obese, and without family history of hypertension. In contrast, 22 women (28.9%) did not experience any marked improvement in hypertension associated with older women, obese, a family history of hypertension, and had hypertension for long periods exceeding 6 years.

Conclusion: A total hysterectomy may be considered an option for improving or normalizing the high blood pressure in women with adenomyosis, especially in the absence of other precipitating risk factors.

Keywords: Adenomyosis, hysterectomy, hypertension, blood pressure, obese.

INTRODUCTION:

In general, adenomyosis is known as a benign is gynecological disorder identified by existence of ectopic endometrial glands and stroma within the muscular wall of the uterus inducing a diffuse uterine enlargement [1]. It is already associated with multiparity in women over fourteen years old with menorrhagia [2]. However, it can also occur at a

younger age, accompanied by abnormal uterine bleeding, reduced fertility, chronic pelvic pain, or even without symptoms [3,4]. In addition, leiomyomas or congenital uterine malformations may go along with adenomyosis [5]. In general, inflammation, chronic pain, and continuous stimulation of the sympathetic nervous system induce an increase in peripheral vascular resistance and thus raise blood pressure [6,7].



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Generally, hypertension is considered a rare silent disease, as it often presents no symptoms in its early stages [8]. It is defined as an abnormally high arterial blood pressure, and measurement is the only way to detect it [9].

In many cases of adenomyosis, surgical intervention may be a better alternative to drug therapy, given its longer duration and varying effects [10]. Hysterectomy is one of the most common surgical procedures for women with uterine diseases that lead to a sudden decrease in the production of the sex hormones as estrogen and progesterone [11]. This allows for a histopathological study of the sample, thus confirming the final diagnosis [12]. Also, it's considered the optimal treatment for this case, as eliminating source of chronic pain, bleeding, and inflammation relieves pressure on the body and positively affects blood pressure [13]. On the other hand, the relationship between hypertension and adenomyosis remains a subject of ongoing research among gynecologists [14]. Previous studies have shown that adenomyosis may predispose to hypertension through abnormal placental development, spiral artery dysfunction, and intrauterine oxidative stress [15,16]. Although the benefit of total abdominal hysterectomy (TAH) has been demonstrated in eliminating the symptoms of adenomyosis, the subsequent physiological changes in arterial blood pressure levels have not been sufficiently proactively studied [17]. This study was designed to evaluate the improvement in hypertension among women with adenomyosis who underwent total abdominal hysterectomy.

MATERIAL AND METHOD:

Patients and study design: In current prospective observational cohort study participated about (110) women patients scheduled for total abdominal hysterectomy (TAH) after confirmation of their diagnosis with adenomyosis, (76) of them had a history of hypertension for at least 6 months (Table 1, Figure 1) in obstetrics and gynecology wards of private hospitals in Diyala Governorate, Iraq, between February and October 2025. Blood pressure should be recorded one week before surgery, along with documentation of the types and dosages of blood pressure medications. Follow-up appointments are scheduled for sixth months

post-surgery. The most important step is to re-measure blood pressure and approve any modifications to blood pressure medications, whether reducing the dose or even stopping the medication, under the supervision of an internist/cardiologist. Body mass index (BMI) was calculated by dividing body weight in kilograms by the square of height in meters. BMI values were classified as: Obese if $> 25 \text{ kg/m}^2$, and non-obese if $\leq 25 \text{ kg/m}^2$. The final data were statistically processed using SPSS software and tabulated descriptively by frequencies and percentages. The ages of the participants were presented with the mean and standard deviation. The chi-square test was used to assess differences between groups, and any difference of less than 0.05 was considered statistically significant.

Table 1: Blood pressure in all studied women with adenomyosis .

Blood Pressure	Adenomyosis N=110
Normotensive	34 (31%)
Hypertension	76 (69%)

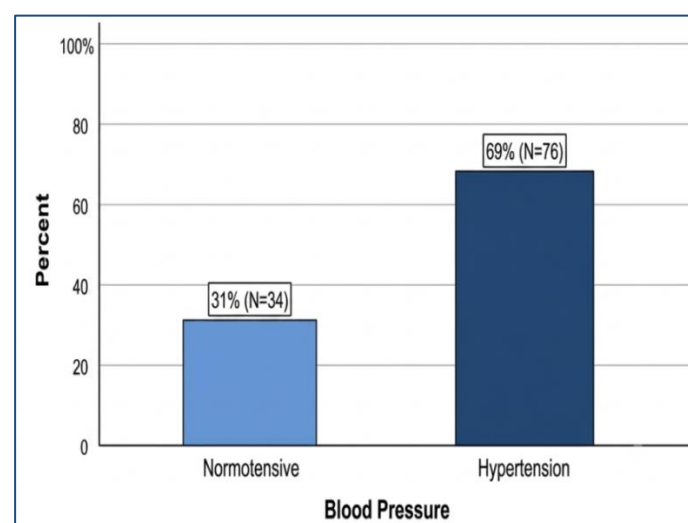


Figure 1: Blood pressure distribution in all studied women (N=110).

Inclusion Criteria: Women aged 35-50 years diagnosed with adenomyosis and histopathologically confirmed post-surgery, who have undergone total hysterectomy.

Exclusion Criteria: Women less than 35 years and over 50 years of age with unconfirmed histological diagnosis of adenomyosis after surgery. Also, patients with concomitant bilateral oophorectomy, chronic renal disease, and cardiovascular problems were excluded.

Post-operative follow-up

The study evaluated a total of 76 cases of women with a history of hypertension for at least 6 months who had a histologically confirmed diagnosis of adenomyosis and underwent total hysterectomy. They were monitored after 6 months to measure changes in blood pressure readings and medication dosages. A comparison was made between a group (G1) whose hypertension improved and a group (G2) whose hypertension did not improve significantly as followings:

- I- G1= Improved means : A patient is classified in this group if one of the following conditions is met at the end of the follow-up period 6 months after surgery:
- A- Complete Remission/Normalization: Blood pressure has returned to normal (Normotensive <140/90 mmHg) with all blood pressure medications being discontinued completely.
 - B- Clinical Improvement: Blood pressure remains within the normal range, but with a reduction in the number of medications or a reduction of the daily dose by at least half.
- II- G2= Not Improved means: Stabilization of high blood pressure (Hypertension $\geq 140/90$ mmHg) readings using the same number of medications and the same doses that were taken before the hysterectomy, without any significant decrease in readings .

RESULT:

Out of 76 women patients with adenomyosis underwent total abdominal hysterectomy, 54 of them showed a significant improvement in their high blood pressure after 6 months of follow-up post operation, representing the majority rate (71.1%), versus 22 women patients their hypertension did not improve, representing the fewer rate (28.9 %) as shown in Figure 2 and Table 2.

Table 2 : Post-operative blood pressure outcome

Blood pressure outcome	G1= Improved	G2= Not Improved	P-value
Post-operative hypertension	54 (71,1 %)	22 (28,9 %)	< 0.001
Total	76 (100%)		

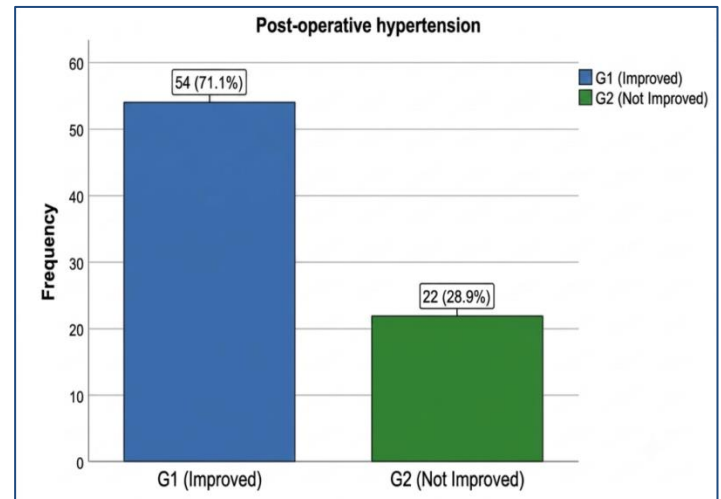


Figure 2: Blood pressure outcome in women with adenomyosis (N=76).

Regarding the baseline characteristics of adenomyosis patients with hypertension (Table 3), the results demonstrated that patients whose hypertension improved at younger ages (42.5 ± 4.2) were significantly more (0.012) likely to experience improvement compared to older women (49.3 ± 5.1) whose hypertension did not improve after total abdominal hysterectomy. The duration of suffering from high blood pressure in the improvement group was less than two years, compared to six years or more in the non-improvement group, with a clear and significant difference (0.003) .

Table 3: Characteristics of adenomyosis patients with hypertension.

Characteristics		G1= Improved N=54	G2= Not Improved N=22	P-value
Age (years)		42.5 ± 4.2	49.3 ± 5.1	0.012*
Duration of Hypertension		< 2 years	≥ 6 years	0.003*
Family History	Yes	10 (18.5%)	15 (68.1%)	0.024*
	No	44 (81.5%)	7 (31.9%)	
Body Mass Index	Obese	18 (33.3%)	16 (72.7%)	0.002*
	Non-obese	36 (66.7%)	6 (27.3%)	

Also, it was found that the family history of hypertension among women in the improved group did not exceed 10 (18.5%), compared to 44 without a family history (81.5%). Meanwhile, the highest percentage 15 (68.1%) women in the non-improved group had a family history, compared to 7 (31.9%) without a family history, resulting in a statistically significant difference of (0.024).

As for body mass index (BMI), the highest proportion was non-obese 36 (66.7%), against obese 18 (33.3%) among the improvement group women. Conversely, the highest rate was observed among obese 16 (72.7%) compared to non-obese 6 (27.3%) in the non-improvement group. The difference was statistically clear (0.002).

Of 54 women with post-operative hypertension improved, 35 (64.8%) showed clinical improvement six months post-surgery, representing the majority, while 19 (35.2 %) women achieved complete recovery, with their blood pressure returning to normal levels, as illustrated in Figure 3 and Table 4.

Table 4: Post-operative improvement of hypertension in adenomyosis patients.

Improved blood pressure	Clinical Improvement	Complete Remission/Normalization
Post-operative hypertension	35 (64.8 %)	19 (35.2 %)
Total	54 (100%)	

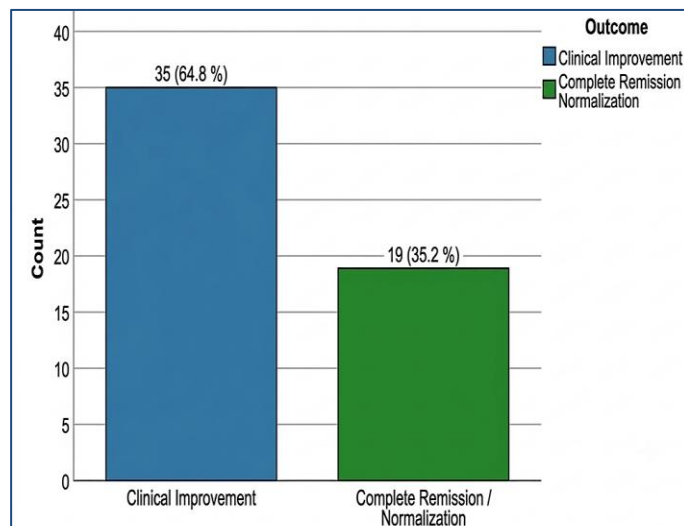


Figure 3: Post-operative improvement of hypertension in patients (N=54).

DISCUSSION:

According to the World Health Organization, the proportion of adult individuals with hypertension has risen to over one billion in recent years, with this increase occurring primarily in low and middle income countries [18]. In this study women had hypertension were 76 (69%) versus 34 (31%) normotensive in 110 women patients with adenomyosis. Regarding the association between adenomyosis and hypertension, these results demonstrated an augmented risk of hypertension in studied women with adenomyosis, attributing this to its inflammatory nature, which may be a strong contributing factor to hypertension as comorbidity [19]. It's worth to know that chronic systemic inflammation is believed to play a role, as elevated levels of inflammatory proteins in plasma have been shown to increase risk of hypertension in women [20].

This finding aligns with a similar study by Gymnastiari and Kurniati (2025) on 130 cases that documented a strong association between hypertension and adenomyosis. Women with high blood pressure were 2.7 times more potential to develop adenomyosis than women with normal blood pressure [21]. In a study by Jung *et al.* (2024), confirmed that patients with proved diagnosed of adenomyosis had a clearly raise risk of hypertension during pregnancy [22]. Furthermore, results are consistent with a study by Gizzo *et al.* (2016) in Italy, found more than 89% of women with adenomyosis had a history of hypertension, supporting the hypothesis that vascular disorder is a major

pathogenic factor [23]. For the group of women who did not improve after total abdominal hysterectomy, and who constituted the smaller percentage, it was found that the majority (72.7%) were obese. This may be attributed to the fact that obesity is a primary and independent factor in hypertension [24].

It is a worrying global pandemic that increase risk of high blood pressure and cardiovascular disorders, raising the costs to the healthcare system [25]. There are several overlapping factors underlying obesity-related hypertension, including changes in cardiovascular output and systemic vascular resistance dynamics [26]. It is worth noting that genetic susceptibility remains a key agent in the interaction between obesity and high blood pressure [27]. In a previous study by Mohammad and Bansod (2024) included standardized blood pressure measurements for 1.5 million individuals, they concluded that age is the strongest un-modifiable predictor of hypertension, and that older women are more possibility to develop hypertension as they age. Obese women, based on body mass index, also have a higher risk [28]. Meanwhile, Kotchen (2010) previously asserted that weight loss induces a drop in blood pressure in overweight individuals, encouraging the development of community-based programs for obesity prevention and treatment that consider the overall cardiovascular risk of hypertension in obese patients [29].

Li *et al.*, (2024) in their retrospective research on 154 adults' women found that adenomyosis patients had significantly higher body mass index [30]. Performing an abdominal hysterectomy is indeed a delicate anatomical procedure because, in its simplest form, it involves cutting the supporting tissues and removing the uterus. Therefore, the surgeon (gynecologists) must be highly skilled and experienced, possessing sound medical judgment [31]. Younes and Tulandi (2018) proved that surgical excision is the optimal traditional treatment for women with symptomatic adenomyosis by systematically reviewing 27 studies of 1398 patients and confirmed that adenomyosis excision was effective in controlling symptoms [32]. This means that hysterectomy permanently cures symptoms such as pain and inflammation once the affected organ is removed. It is worth noting that chronic pain induces stress, activating the sympathetic nervous system and secreting

cortisol and adrenaline hormones that raise blood pressure, but the disappearance of pain after hysterectomy leads to relaxation of blood vessels and a reduction in systolic blood pressure [33].

CONCLUSION:

The study concluded that total hysterectomy is an option for treating or improving hypertension associated with adenomyosis by excision the affected organ and eliminates accompanying symptoms that trigger stress and high blood pressure. However, risk factors including obesity, older age, had hypertension for long periods, and family history may hinder blood pressure improvement even after surgical intervention.

Ethical Approval: This study was conducted after obtaining approval from the Medical Ethics Committee of the College of Medicine in Diyala, affiliated with the Iraqi Ministry of Higher Education and Scientific Research (IRB No. 88/6/1-2025).

Informed Consent: Informed consent was obtained from all participants prior to their inclusion in the study. Participants were informed that their data would be kept confidential and used solely for research purposes.

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Conflict of Interest: The authors declare that they have no competing interests.

Data availability statement: The dataset presented in this study is available on request from the corresponding author.

AI Use Disclosure: No generative AI tools were used in the writing or data analysis. AI tools were limited to language assistance. The authors remain fully responsible for the content.

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