

## Anaesthetic Challenges and Peri-Operative Management of a Thrombocytopenic Patient Going for Hysterectomy

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### Abstract:

**Background:** Thrombocytopenia (platelet count  $<150 \times 10^9/l$ ) is one of the most common disorders in hospitalised patients associated with increased infectious morbidity after hysterectomy. The present study aimed to assess the anaesthetic challenges and peri-operative management of patients with thrombocytopenia undergoing hysterectomy.

**Methods:** The present study included a retrospective analysis of 2000 patients with thrombocytopenia who underwent hysterectomy, compared to 60,000 patients with normal platelet count, matched for age, body mass index (BMI), and routes of hysterectomy. Clinical factors such as age, BMI, parity, length of stay, comorbidities (diabetes mellitus, hypertension, heart failure, previous cardiac intervention, chronic obstructive pulmonary disease), pre-operative transfusion, uterine weight, routes of hysterectomies (abdominal, laparoscopic, and vaginal), and operating time were included in the analysis.

**Results:** The study analyzed 2000 thrombocytopenia patients out of 150,000 hysterectomies during the 2 yrs. Study period. Moderate thrombocytopenia patients had lower platelet count, shorter pre-operative time, higher chronic comorbidities like hypertension and diabetes, higher pre-operative transfusion rates, and higher uterine weight than those with mild thrombocytopenia and normal platelet count. Operating time it was varied among patients with moderate, mild, and normal platelet count.

**Conclusion:** The study found that patients with moderate thrombocytopenia had lower platelet counts and higher comorbidities than mild patients. It highlights the importance of pre-operative transfusion and careful peri-operative management to minimize bleeding risks. The findings offer insights into anaesthetic challenges and management strategies for thrombocytopenic patients undergoing hysterectomy.

**Keywords:** Thrombocytopenia, peri-operative management, abdominal hysterectomy, laparoscopic hysterectomy, vaginal hysterectomy.

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### Introduction

Thrombocytopenia is a platelet count of less than  $150 \times 10^9 l^{-1}$  and is prevalent in the peri-operative period, occurring in 5-10% of patients [1,2]. A thorough pre-operative evaluation should include a thrombocytopenia assessment, first through a history and physical examination, and then, if necessary, with laboratory testing to identify patients at risk for surgical bleeding [3].

A normal platelet count ranges from 150 to  $450 \times 10^9 l^{-1}$ , with inter-laboratory variance [4]. The baseline platelet count is relatively steady across an individual's lifespan if no physiologic or pathophysiologic disturbances [5]. Although platelets play a crucial role in the multifactorial process of surgical hemostasis, a normal platelet count is 15-40 times higher than the threshold required for hemostasis [6,7].

Platelets, in addition to hemostasis, play an important role in wound healing and inflammatory responses, and previous research has connected thrombocytopenia to an increase in infection morbidity following non-gynecologic surgery [8,9]. The same cannot be said about hysterectomy.

Despite reducing hysterectomy rates over the last two decades, it is still the most common major gynaecological treatment [10,11]. Leiomyomas, endometriosis, and prolapse are the most common benign indications, followed by pelvic pain, dysfunctional uterine haemorrhage, adenomyosis, pelvic inflammatory disease, and obstetric symptoms [12, 13].

Thrombocytopenia is linked to greater infectious morbidity following hysterectomy [14]. The platelet count and risk of bleeding should be considered in

the anaesthetic management of a thrombocytopenic patient undergoing hysterectomy. A spinal block can be administered when the platelet count exceeds 50,000/cumm [15]. To reduce the risk of infection, strict asepsis should be maintained during invasive procedures [16]. A multidisciplinary approach is critical in the peri-operative care of thrombocytopenic patients with hysterectomy to reduce complications and improve patient outcomes. Therefore, we aimed to investigate the anaesthetic challenges and peri-operative management of patients with thrombocytopenia undergoing hysterectomy.

### Materials and Methods

This retrospective observational study was performed at the Department of Obstetrics and Gynaecology at SHKM Govt Medical College, Nuh, Haryana, India.

### Inclusion Criteria

The study included patients with thrombocytopenia and those who had laboratory data with fewer complications.

### Exclusion Criteria

The analysis excluded patients with bowel resection, lymphadenectomy, radical hysterectomy, ascites, metastasis, malignancy, sepsis and open wounds.

### Methodology

Patients were divided into three groups by a normal platelet count, mild thrombocytopenia ( $100-149 \times 10^3$  platelets/ $\mu\text{l}$ ), and moderate thrombocytopenia ( $50-99 \times 10^3$  platelets/ $\mu\text{l}$ ) [17]. Age, body mass index (BMI), parity, length of stay, diabetes mellitus, hypertension requiring medication, history of congestive heart failure or prior cardiac intervention, chronic obstructive pulmonary disease, pre-operative transfusion, uterine weight, routes of hysterectomies (abdominal, laparoscopic, and vaginal) and operating time were clinical factors included in the analysis. All pre-existing clinical problems were those that existed within the preceding six months of surgery.

### Statistical Analysis

Descriptive data were presented as median or mean $\pm$ SD. While, inferential statistics were determined through Chi-square and Kruskal–Wallis test in SPSS software. P-values  $<0.05$  were considered statistically significant.

### Ethical Approval

The Human Ethical Committee of the Department of approved the above study. Written informed consent was taken from all the patients before the examination.

### Results

Of the 1,50,000 hysterectomies conducted throughout the research period, 2000 patients had thrombocytopenia. These patients' data were compared to 60,000 people with normal platelet levels matched for age, BMI, and hysterectomy routes. Table 1 highlights the importance of pre-operative evaluation and management of thrombocytopenia in patients undergoing benign hysterectomy. The data is divided into three categories: normal platelet count, mild thrombocytopenia ( $100-149 \times 10^3$  cells/ $\mu\text{l}$ ), and moderate thrombocytopenia ( $50-99 \times 10^3$  cells/ $\mu\text{l}$ ). Patients with moderate thrombocytopenia had a significantly lower platelet count ( $88.5(80-97) \times 10^3$  cells/ $\mu\text{l}$ ) compared to those with mild thrombocytopenia ( $132.5(115-150) \times 10^3$  cells/ $\mu\text{l}$ ) and normal platelet count ( $275(200-350) \times 10^3$  cells/ $\mu\text{l}$ ) ( $P=<0.00001$ ). The pre-operative time for the moderate group was shorter (3.5 days) than the mild (5.5 days) and normal platelet count (6 days) groups. Age and BMI of the patients were similar across all three groups. Patients with thrombocytopenia were also more likely to have chronic comorbidities such as hypertension & diabetes. Pre-operative transfusion rate was significantly higher (5%) in moderate group compared to those with mild thrombocytopenia (2.06%) and normal platelet count (0.2%) ( $P=0.003$ ). Patients with prior abdominal surgery are likelier to have moderate or mild thrombocytopenia than those with normal platelet count.

**Table 1: Patient baseline characteristics grouped according to the severity of thrombocytopenia**

Characteristics	Thrombocytopenia		Normal platelet count (n=60,000)	P value
	Moderate (n=300)	Mild (n=1700)		
Platelet count ( $10^3$ cells/ $\mu\text{l}$ )	88.5 (80-97)	132.5 (115-150)	275 (200-350)	$<0.00001$
Pre-operative time (day)	3.5 (0-7)	5.5 (1-10)	6 (2-12)	0.081
Age (years)	52.5 (45-60)	50 (43-57)	49.5 (44-55)	0.235
BMI	28.4 (26.2-35.4)	27.3 (25.3-31.7)	30.2 (28.2-34.2)	
Parity	2 (0-2)	2 (1-3)	2 (1-3)	0.120
Diabetes mellitus	25 (8.3%)	200 (11.8%)	4000 (6.7%)	
Hypertension	100 (33.3%)	550 (32.4%)	17000 (28.3%)	
Pre-operative haematocrit (%)	30.7 $\pm$ 10.5	33.3 $\pm$ 12.3	33.6 $\pm$ 12	
Pre-operative transfusion	15 (5%)	35 (2.06%)	120 (0.2%)	0.003
Prior abdominal surgery	85 (28.3%)	530 (31.2%)	18000 (30%)	$<0.00001$

The peri-operative characteristics of the patients showed that uterine weight was higher in patients with mild thrombocytopenia (169 g) compared to those with moderate thrombocytopenia (145 g) and normal platelet count (254 g). Operating time also differed in patients with moderate thrombocytopenia (116 min), mild thrombocytopenia (104.5 min) and normal platelet count (110 min). Peri-operative transfusion was observed higher in patients with moderate thrombocytopenia (10%) compared to

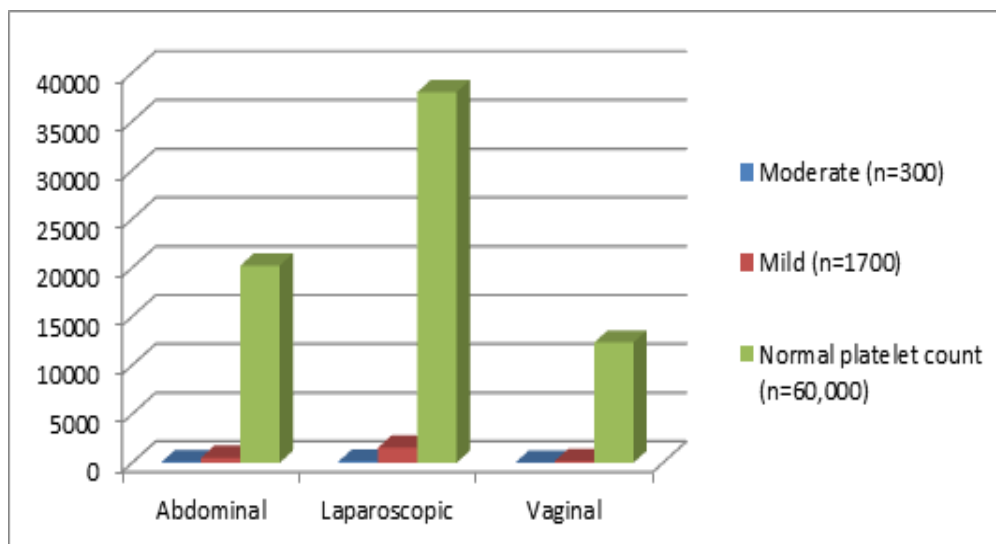
those with mild thrombocytopenia (5%) and normal platelet count (2.75%). Time till post-operative transfusion was shorter in patients with moderate thrombocytopenia (1 day) compared to those with mild thrombocytopenia (0 days) and normal platelet count (0 days). Furthermore, length of stay was shorter in patients with moderate thrombocytopenia (1 day) compared to those with mild thrombocytopenia (1 day) and normal platelet count (1 day) (Table 2).

**Table 2: Peri-operative characteristics of the patients.**

Characteristics	Thrombocytopenia		Normal platelet count (n=60,000)	P value
	Moderate (n=300)	Mild (n=1700)		
Uterine weight (g)	145 (70-220)	169 (90-247)	254 (130-378)	<0.00001
Operating time (min)	116 (82-150)	104.5 (77-132)	110 (80-140)	0.0056
Perioperative transfusion	30 (10%)	85 (5%)	1650 (2.75%)	<0.00001
Time till post-operative transfusion (day)	1	0	0	<0.001
Length of stay (day)	1	1	1	<0.001

Figure 1 shows the number of hysterectomies performed in patients with different levels of thrombocytopenia (low platelet count) and those with normal platelet count. The types of hysterectomies performed were abdominal, laparoscopic, and vaginal. The percentage of abdominal hysterectomies performed in patients with moderate thrombocytopenia was 27.7%, while those with mild thrombocytopenia were 30.6%. In the normal platelet count group, the percentage was 33.7%. The rate of laparoscopic hysterectomies

performed in patients with moderate thrombocytopenia was 48.3%, while those with mild thrombocytopenia were 90.2%. In the normal platelet count group, the percentage was 63.3%. The rate of vaginal hysterectomies performed in patients with moderate thrombocytopenia was 9%, while those with mild thrombocytopenia was 11.2%. In the normal platelet count group, the percentage was 20.6%. The p-value for comparing the three groups was less than 0.00001, indicating a statistically significant difference.



**Figure 1: Hysterectomies performed in different thrombocytopenic patients.**

The results of complications associated with hysterectomy in thrombocytopenic patients are indicated in Table 3. Post-operative bleeding occurred in 1.7% of patients with moderate thrombocytopenia, 2.06% with mild thrombocytopenia, and 0.05% with normal platelet count. Pelvic abscess occurred in 1% of patients

with moderate thrombocytopenia, 1.5% with mild thrombocytopenia, and 7.5% with normal platelet count. Sepsis occurred in 0.7% of patients with moderate thrombocytopenia, 1.06% with mild thrombocytopenia, and 0.2% with normal platelet count. Pneumonia occurred in 1.33% of patients with moderate thrombocytopenia, 0.18% with mild

thrombocytopenia, and 0.19% with normal platelet count. Post-operative fever occurred in 4% of patients with moderate thrombocytopenia, 3.71% with mild thrombocytopenia, and 2.15% with normal platelet count. UTI occurred in 2.7% of patients with moderate thrombocytopenia, 3.82% with mild thrombocytopenia, and 2.61% with

normal platelet count. MI/cardiac arrest occurred in 0.7% of patients with moderate thrombocytopenia, 5.8% with mild thrombocytopenia, and 0.05% with normal platelet count. The p-values for comparing patients with post-operative fever and MI/cardiac arrest were less than 0.001, indicating a statistically significant difference.

**Table 3: Complications associated with hysterectomy in thrombocytopenic patients.**

Complications	Thrombocytopenia		Normal platelet count (n=60,000)	P value
	Moderate (n=300)	Mild (n=1700)		
Post-operative bleeding	5 (1.7%)	35 (2.06%)	30 (0.05%)	0.30
Pelvic abscess	3 (1%)	25 (1.5%)	45 (7.5%)	>0.05
Sepsis	2 (0.7%)	18 (1.06%)	112 (0.2%)	>0.05
Pneumonia	4 (1.33%)	3 (0.18%)	119 (0.19%)	0.052
Post-operative fever	12 (4%)	63 (3.71%)	1290 (2.15%)	<0.001
UTI	8 (2.7%)	65 (3.82%)	1564 (2.61%)	>0.05
MI/cardiac arrest	2 (0.7%)	1 (5.8%)	27 (0.05%)	<0.001

## Discussion

The current study found that individuals with moderate thrombocytopenia have a lower platelet count than patients with mild thrombocytopenia and normal platelet count. A platelet count of more than  $50 \times 10^3/\mu\text{l}$  is safe for most non-neurologic and non-ocular procedures without further measures, according to the guidelines for minimum platelet thresholds before invasive procedures [18-20,21]. However, data on minimal platelet thresholds for surgery are primarily based on practice reviews and expert opinion; additionally, studies on which these recommendations are based typically do not include hysterectomy, despite mounting evidence that bleeding risk varies by procedure type [17, 21-24].

Studies have demonstrated that it is challenging to predict spontaneous bleeding in people with platelet levels greater than  $10 \times 10^3/\mu\text{l}$ , and that the relationship between falling platelet levels and the risk of peri-operative bleeding is nonlinear [25]. This is most likely because hemostasis is influenced by several factors, including systemic illness, patient age, and the cause of thrombocytopenia [26, 27]. Peri-operative features revealed that individuals with moderate thrombocytopenia had lower uterine weight than those with mild thrombocytopenia and normal platelet count. Benassi *et al.* [28] looked at uterine weight as a risk factor for peri-operative complications in women having vaginal (n=60) versus abdominal (n=59) hysterectomy for fibroid uteruses weighing 200-1300 g. Similarly, Darai *et al.* [29] investigated uterine weight as a risk factor for vaginal hysterectomy completion success. According to the researchers, the vaginal hysterectomy group had lower complication rates than the laparoscopic-assisted vaginal hysterectomy group.

Among all the hysterectomy performed, laparoscopic hysterectomy was higher, followed by

abdominal hysterectomy and then vaginal hysterectomy. The type of hysterectomy performed may depend on the level of thrombocytopenia in the patient. The laparoscopic hysterectomy (LH) procedure was invented as a less invasive alternative to the open abdominal or vaginal approach and was initially described by Reich in 1989 [30]. Laparoscopic gynaecological surgery has several benefits over open surgery that are widely known, such as less post-operative discomfort, fewer surgical site infections, a shorter hospital stay, a speedier return to normal activities, a smaller drop in haemoglobin, and a lower incidence of post-operative adhesions [31]. Despite these various advantages, LH has not completely replaced abdominal hysterectomy, as may have been predicted in the years following its introduction, and approximately 50% of hysterectomies are still performed this way [32].

In addition to the risk of bleeding-related complications, higher pelvic abscess rates were found in patients with normal platelet counts compared to patients with thrombocytopenia. Post-operative fever was more common in patients with thrombocytopenia than those with normal platelet count. MI/cardiac arrest was more common in patients with mild thrombocytopenia than in patients with moderate thrombocytopenia and normal platelet count. In addition to having more severe infections regardless of the operation, several studies have shown a correlation between thrombocytopenia and a greater incidence of incisional infections in patients [33, 34]. The growing body of research shows that platelets are crucial for inflammation and immunity [35, 36] and that a correlation between thrombocytopenia and post-operative infection provides more evidence supporting this link.

## Conclusion

The present study concluded that patients with thrombocytopenia, especially those with moderate thrombocytopenia, had significantly lower platelet counts and higher rates of comorbidities than those with mild thrombocytopenia and normal platelet count. The study highlighted the importance of pre-operative transfusion and careful peri-operative management in patients with thrombocytopenia to minimize the risk of bleeding complications. The findings of this study provide valuable insights into the anaesthetic challenges and peri-operative management strategies for thrombocytopenic patients undergoing hysterectomy. Further investigation is needed to evaluate the impact of thrombocytopenia on outcomes in patients undergoing different surgical procedures.

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