

LABORATORY STUDY OF THE MEAN PLATELET VOLUME IN PATIENTS WITH
LARYNGEAL CANCER BEFORE AND AFTER SURGERYMoayad Jalal Kheirbek*¹

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ABSTRACT

The larynx is the area most affected by cancer in the head and neck, with an incidence rate of 100,000/5, and the number of deaths is estimated at 82,000 annually. The research aimed to study the laboratory parameters of the mean platelet volume (MPV), by studying the difference in the mean platelet volume of patients before and after surgery, and then comparing these values with a control group. The research was conducted on all patients who had been diagnosed with laryngeal cancer from the Department of Otorhinolaryngology and Surgery at Tishreen University Hospital in Latakia, and who had undergone surgery for this tumor, after obtaining informed consent. A prospective study was conducted, and the number of patients reached (30) patients. A search form was organized for patients. The research results showed that there were no significant changes in the mean platelet volume (MPV) in Patients With Laryngeal Cancer one week after surgery compared to their values before surgery. Laryngeal cancer patients have significantly higher MPV levels than healthy people, both before and after surgery. The research recommends the importance of conducting further studies to confirm our findings in larger groups of patients. The association of MPV with clinical outcomes for patients should be evaluated and factors that may influence their MPV such as type of cancer and stage of disease should be investigated.

KEYWORDS: Mean platelet volume (MPV), laryngeal cancer, patients.

INTRODUCTION

Laryngeal cancer is one of the most common head and neck cancers—ranking second globally—and represents the most frequent site of carcinoma within the upper aerodigestive tract.

In recent years, researchers have shown significant interest in the status of the blood fibrinolytic system in patients with malignant tumors across various organs. Unlike normal cells, tumor cells produce specific plasminogen-activating proteins that can influence both local and systemic hemostatic systems; they also contribute to the generation of collagen-degrading enzymes, thereby promoting tumor invasion and metastasis.

Given that approximately 7% of head and neck cancer patients die from post-operative hemorrhage or

thrombosis, and considering the scarcity of detailed information regarding fibrinolysis in laryngeal cancer patients, there is a clear gap in knowledge. Current studies fail to elucidate the complex dynamics of this highly active biological system—particularly in the post-operative period—and previous research has relied on outdated, routine biochemical methods.

This research is significant for understanding the role of Mean Platelet Volume (MPV) in laryngeal cancer. The findings may elucidate how laryngeal cancer affects MPV and determine whether associated changes correlate with an increased risk of surgical complications. Furthermore, preoperative MPV measurements could serve as a predictive tool for surgical complication risks in laryngeal cancer patients, thereby enabling personalized care and improving

surgical outcomes by identifying high-risk patients and facilitating preventive interventions.

Consequently, the results of this study could lead to the development of novel treatments to improve outcomes for patients undergoing laryngeal cancer surgery.

The study aims to examine MPV parameters in laryngeal cancer patients both pre- and post-operatively by analyzing the difference in MPV values between these two stages and comparing them with a control group.

METHODS AND MATERIALS

This prospective study was conducted on 30 patients diagnosed with laryngeal cancer who were treated at the Department of Otorhinolaryngology (ENT) and Head and Neck Surgery at Tishreen University Hospital in Latakia and underwent surgery for the tumor. Informed consent was obtained from all participants.

A specific patient data form was designed, covering the following:

- 1- Patient demographics.
- 2- Presenting complaint: The primary reason for the patient's visit.
- 3- Medical history: Details of the presenting complaint and associated symptoms, as well as past medical, medication, and family history.
- 4- Clinical examination: Clinical and endoscopic examination of the larynx.
- 5- Radiological investigations: Imaging studies to determine tumor staging.
- 6- Pathological findings.
- 7- Laboratory parameters: Mean Platelet Volume (MPV) measured both pre- and post-operatively.

Comparisons were made regarding MPV laboratory results between patients and control subjects immediately before surgery; between patients and control subjects one week after surgery; and within the patient group itself (comparing pre-operative values with those obtained one week post-operatively).

Exclusion criteria: Patients not undergoing surgery; those who had undergone surgery or suffered severe tissue trauma within the preceding two months; those who had received radiotherapy or chemotherapy within the preceding three months; patients with active infections or serious hepatic, renal, or hematological diseases; and patients with other concurrent malignancies or a history of prior malignancy. Equipment used: Analyzers (Sysmex 5-part and 3-part systems) for determining MPV values.

Reagents: Reagents from global companies recognized by scientific research centers such as Stago and Biorex were used in this study.

RESULTS AND DISCUSSION

Laboratory results for Mean Platelet Volume (MPV) were compared for patients immediately before surgery and one week post-surgery; additionally, patient MPV results were compared with those of the control group both immediately before surgery and one week post-surgery.

-Comparison of MPV laboratory test results for patients immediately before surgery and one week after surgery.

Table 1: Results of the t-test comparing MPV values in patients immediately before surgery and one week post-surgery.

Paired Samples Statistics

MPV	N	Mean	Std. Deviation	Std. Error Mean
Pre-surgical	30	10.5167	1.12344	0.20511
Post-surgical	30	10.5800	1.05549	0.19271

Paired Samples Test

T	Df	Sig. (2-tailed)	Mean	Std. Error Mean	95% Confidence Interval of the Difference	
					Lower	Upper
-1.491	29	0.147	-0.06333	0.23265	-0.15021	0.02354

Table (1) shows that the mean MPV value for patients prior to surgery was 10.5167 fL (standard deviation: 1.12344), while the mean MPV value one week post-surgery was 10.58 fL (standard deviation: 1.05549). The significance value was found to be $P=0.147$ (>0.05), indicating no statistically significant difference between the mean MPV values before surgery and one week after surgery.

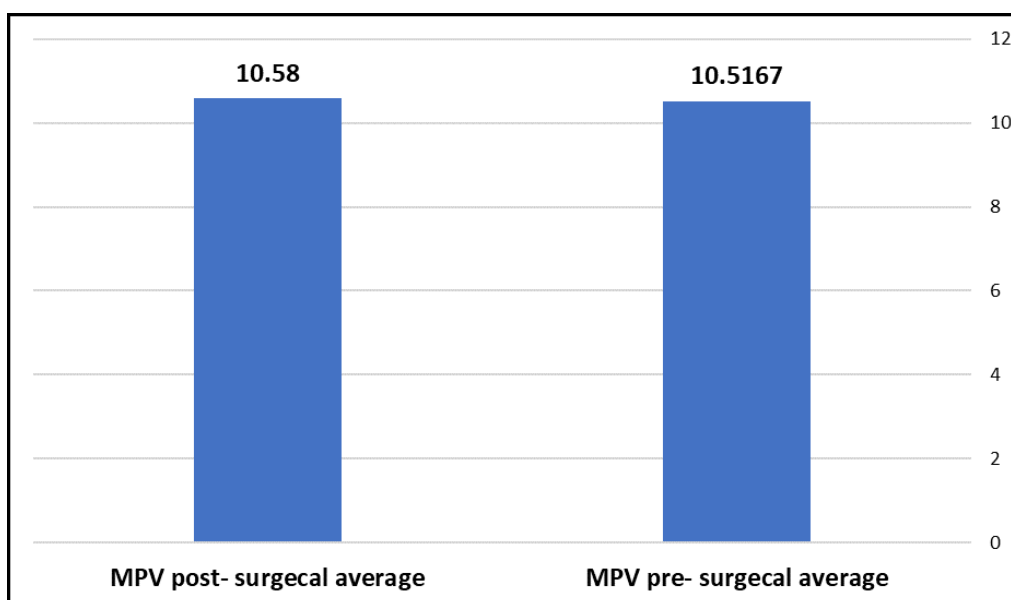


Figure 1: Chart of the difference between MPV values for patient before surgery and one week postoperatively.

There are several potential reasons why MPV remains unaffected by laryngeal cancer surgery during the first week post-operation.

a- The body's natural response: Following surgery, the body initiates a healing process to repair damaged tissues. While this process may lead to a slight increase in the platelet count, such a rise is usually insufficient to significantly alter the MPV. Furthermore, the body may not have had enough time within the first week after surgery to produce substantial changes in MPV.

b- Limited impact of the surgery: Laryngeal cancer surgery may not affect the bone marrow the site of platelet production. If the bone marrow remains

unaffected, no significant change in MPV would be expected. Additionally, the surgery may be limited in scope, meaning it does not impact a large proportion of the body's total platelet count.

c- Other factors: Individual factors may play a role in the patient's response to surgery; for example, some patients may possess stronger compensatory mechanisms that prevent significant changes in MPV.

-Comparison of laboratory test results of MPV for patients immediately before surgery and the control group.

Table (2) t-test results for the difference in the results of MPV laboratory tests For patients immediately before surgery, with the control group.

Group Statistics

MPV	N	Mean	Std. Deviation	Std. Error Mean
Pre-surgical	30	10.5167	1.12344	0.20511
Control group	30	8.8000	0.85823	0.15669

Independent Samples Test

T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
6.651	58	0.000	1.71667	0.25811	1.20000	2.23334

From Table (2) it was found that the average mean platelet volume of patients before surgery was (10.5167) fl with a standard deviation of (1.12344), and the mean platelet volume of the control group was (8.8000) fl with a standard deviation of (0.85823). It was found that the probability value of significance $P = 0.000 < 0.05$, which indicates the presence of a statistically significant difference between the average mean platelet volume of patients before surgery and the control group, and this difference is in favor of the platelet mean volume of patients before surgery.

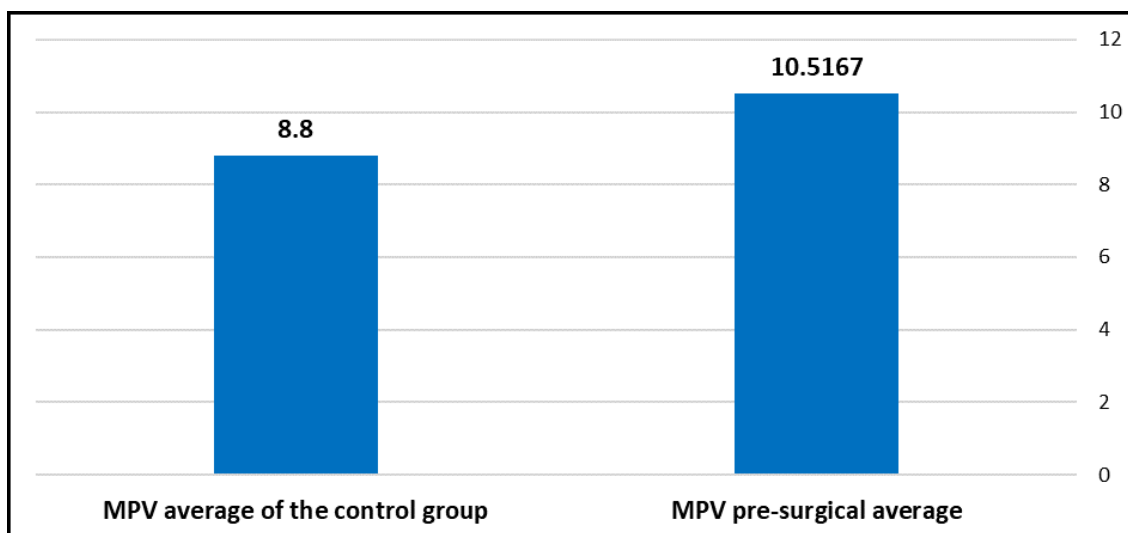


Figure (2) Chart of the difference between MPV values for preoperative patients and the control group.

This indicates that patients with laryngeal cancer may have higher MPV levels compared to healthy individuals. There are several possible explanations for this finding:

- a- Inflammation: Laryngeal cancer is often associated with inflammation; inflammation can lead to increased platelet production, which may result in elevated MPV.
- b- The body's response to cancer: The body may release specific chemicals in response to cancer; these

substances can affect platelet production, potentially leading to elevated MPV.

c- Other factors: Individual factors such as age, gender, or lifestyle may play a role in MPV levels. Additionally, other medical conditions, such as blood disorders or autoimmune diseases, may influence MPV.

-Comparison between the results of MPV laboratory tests for patients one week after surgery, with the control group.

Table 3: t-test results. test for the difference in the results of MPV laboratory tests for patients one week postoperatively, with the control group

Group Statistics

MPV	N	Mean	Std. Deviation	Std. Error Mean
Post-surgical	30	10.5800	1.05549	0.19271
Control group	30	8.8000	0.85823	0.15669

Independent Samples Test

1	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
7.167	58	0.000	1.78000	0.24837	1.28283	2.27717

From Table (3), it was found that the average mean platelet volume of patients after one week of surgery was (10.58) fl with a standard deviation of (1.05549), and mean platelet volume of the control group was (8.80) fl with a standard deviation of (0.85823). It was found that the probability value of significance was $P=0.000<0.05$, which indicates the presence of a statistically significant difference between the average mean platelet volume values of patients after one week of surgery and the control group, and this difference is in favor of the mean platelet volume of patients after one week of surgery.

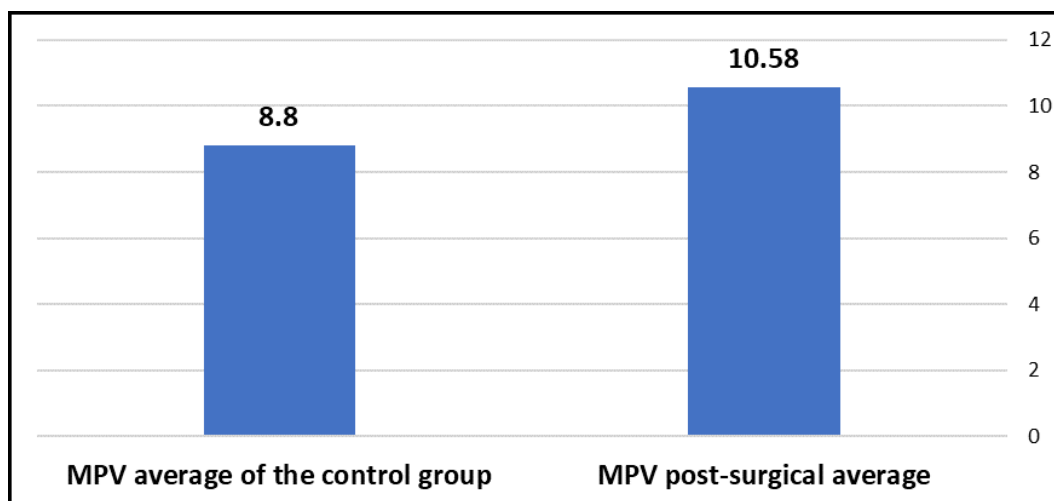


Figure (3) Chart of the difference between MPV values for patients one week postoperatively and the control group.

This indicates that MPV levels in laryngeal cancer patients may be higher one week after surgery compared to healthy individuals. There are several possible explanations for this finding.

a- The body's response to surgery: Following surgery, the body initiates a healing process to repair damaged tissues; this process may lead to a slight increase in platelet count and, consequently, an increase in MPV.

b- Inflammation: Inflammation levels may rise post-surgery; inflammation can stimulate increased platelet production, potentially leading to elevated MPV.

c- Changes in fibrinogen levels: Studies have shown that levels of fibrinogen a protein essential for blood clotting tend to rise after laryngeal cancer surgery. This can increase platelet aggregation, potentially resulting in a temporary rise in MPV.

CONCLUSIONS

1- There was no statistically significant difference in Mean Platelet Volume (MPV) values between the pre-operative period and one week post-operatively; this indicates that laryngeal cancer surgery did not affect changes in MPV.

2- There was a statistically significant difference in Mean Platelet Volume (MPV) between patients prior to surgery and the control group; specifically, pre-operative MPV values were higher in laryngeal cancer patients compared to healthy individuals.

3- There is a statistically significant difference between the mean platelet volume (MPV) of patients one week after surgery and that of the control group; this difference favors the MPV value observed one week post-surgery. This indicates that MPV may increase in laryngeal cancer patients one week after surgery.

Recommendations

1- Further studies are needed to confirm these findings in larger patient cohorts.

2- Factors that may influence MPV in laryngeal cancer patients such as cancer type, disease stage, and treatment-related factors should be investigated.

3- The association between MPV and clinical outcomes, such as survival rates and cancer remission, should be evaluated.

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