

**A LABORATORY STUDY OF BLOOD D-DIMER IN LARYNGEAL CANCER PATIENTS
BEFORE AND AFTER SURGERY****Dr. Moayad Kheirbek^{1*}, Mostafa Ibrahim² and Faisal Radwan³**¹Postgraduate Student (PhD), Department of Ear, Nose, Throat and Head Diseases, Faculty of Human Medicine, Tishreen University, Latakia, Syria.²Professor, Department of Ear, Nose, Throat and Head Diseases, Faculty of Human Medicine, Tishreen University, Latakia, Syria.³Assistant Professor, Department of Laboratory Medicine, Faculty of Human Medicine, Tishreen University, Latakia, Syria.***Corresponding Author: Dr. Moayad Kheirbek**

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ABSTRACT

Laryngeal cancer is the second most common head and neck cancer around the world, and the most common site of carcinoma is in the upper respiratory and digestive tracts. The research aimed to study the laboratory parameters of D-Dimer, by studying the difference in D-Dimer values for 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 its 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 D-Dimer values in laryngeal cancer patients increase after surgery compared to their values before surgery, and that there is a statistically significant difference between the D-Dimer values in laryngeal cancer patients before and after surgery and the control group. The research recommends that D-Dimer can be used with other tests to develop new diagnostic tools for laryngeal cancer, and this may help diagnose cancer early, and then treatment will be more effective, and that D-Dimer levels can be monitored after treatment to measure the patient's response to treatment, and this It may help determine if treatment is effective and when treatment adjustments may be needed.

KEYWORDS: D-Dimer, laryngeal cancer, patients.**INTRODUCTION**

Laryngeal cancer is one of the most common head and neck cancers. It is the second most common head and neck cancer around the world and constitutes 2% of diagnosed cancers. The most common site of carcinoma is in the upper respiratory and digestive tracts.^[1,2]

It affects men more than women after middle age, as laryngeal cancer is a male disease, with the male to female ratio being 10/1.

D-Dimer is a by-product of the process of blood clotting and blood thrombolysis. It is a dissolved product derived from the degradation of the interconnected fibrin network mediated by plasmin.^[3] The generation of D-Dimer requires three enzymes: thrombin and activated factor XIII, in addition to plasmin.

The study of laboratory parameters of the D-Dimer in laryngeal cancer patients before and after surgery is an important topic of great importance in the field of medicine and surgery. D-Dimer, a plasma protein, plays a key role in the clotting process. The results of this research can help understand how laryngeal cancer affects D-Dimer levels, determine whether these changes are associated with an increased risk of surgical complications, and Preoperative D-Dimer measurements can also be used to predict the risk of surgical complications in laryngeal cancer patients, allowing for more individualized care.

D-Dimer measurements can help improve surgical patient outcomes by identifying patients who are at greater risk of surgical complications and providing preventive interventions.

Therefore, the results of this research may lead to the development of new treatments to improve the outcomes of patients undergoing laryngeal cancer surgery.

The research aimed to study the laboratory parameters of the D-Dimer in laryngeal cancer patients before and after surgery, by studying the difference in the D-Dimer values of the patients before and after surgery, and then comparing these values with a control group.

METHODS AND MATERIALS

The research was conducted on all patients who had been diagnosed with laryngeal cancer from the Department of Otorhinolaryngology and its Surgery at Tishreen University Hospital in Lattakia, 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 research form was organized for patients, and the form included the following

- 1- Patient's identity.
- 2- The chief complaint :the major health problem or concern ,The complaint brought by the patient.
- 3- History of the present illness: detailing the complaint along with accompanying complaints, past medical, medication and family history.
- 4- Clinical examination: Conduct a clinical and endoscopic examination of the larynx.
- 5- Radiological investigations: A radiological study to determine the stage of the tumor.
- 6- Pathological anatomical findings.
- 7- Evaluate laboratory parameters: D-Dimer before and after surgery.

The results of D-Dimer laboratory tests were compared for patients with controls immediately before surgery, for patients with controls one week after surgery, for patients immediately before surgery and one week after surgery.

Exclusion criteria: non-surgical patients, within 2 months of previous surgery, or severe tissue trauma. Infection, within three months of radiotherapy or chemotherapy, patients with infections or serious hepatic, renal or hematological diseases or patients with other malignant tumors or a history of previous malignancy.

Equipment used: Centrifuge, Wondfo device (FINECARE) and i CHROMA II for D-Dimer calibration.

Kits: In this research, I used kits available from international companies recognized by scientific research centers, such as Stago (France) and Biorex (India).

Samples are collected from the patient by drawing blood and placing it on a tube containing 3.2% sodium citrate and inverting it several times to mix to prevent clotting of the sample, then sending it to the laboratory, and analyzes are conducted on the Wondfo (FINECARE) device or on i CHROMA II.

The normal D-Dimer is considered to be less than 0.50 mg/L, while the suspicious values (positive values) are 0.50 mg/L or greater, and even when the values are positive, this does not absolutely mean that we are facing a thrombotic disease.^[6,5,4]

Possible diagnosis when D-Dimer values are high: Possible diagnoses include pulmonary embolism (PE), deep vein thrombosis (DVT), disseminated intravascular coagulation, or even blood clots anywhere in the body, such as the heart and brain.^[8,7]

Interfering factors: factors that give false positive or negative values, and due to the presence of false negative results, D-Dimer should be performed in cases of low suspicion of pulmonary embolism (PE), deep venous thrombosis (DVT), or disseminated intravascular coagulation (DIC).^[12,11,10,9]

It should be noted that there are many physiological or pathological conditions that may cause the D-Dimer level to rise in patients despite the absence of pulmonary embolism, deep venous thrombosis, or disseminated intravascular coagulation. These include, but are not limited to: pregnancy, malignancy, smoking, trauma, infection and sepsis; Also, elderly patients, patients suffering from autoimmune disorders, or patients who have undergone recent surgery may have an increase in the D-Dimer level. D-Dimer also increases with age, and there are studies being conducted to establish normal D-Dimer values according to age.

RESULTS AND DISCUSSION

Work was done to compare the results of D-Dimer laboratory tests for patients immediately before surgery and a week after surgery, as well as to compare the results of D-Dimer laboratory tests for patients with control cases immediately before surgery and for patients with control cases one week after surgery.

Comparison between the results of D-Dimer laboratory tests for patients immediately before surgery and a week after surgery:

Table 1: T-test results for the difference in the results of D-Dimer laboratory tests For patients immediately before surgery and one week after surgery.

	N	Mean	Std. Deviation	Std. Error Mean
pre-surgical	30	0.4263	0.12588	0.02298
post-surgical	30	2.0890	0.73325	0.13387

Paired Samples Test

T	Df	Sig. (2-tailed)	Mean	Std. Error Mean	95% Confidence Interval of the Difference	
					Lower	Upper
-13.997	29	0.000	-1.66267	0.65064	-1.90562	-1.41971

From Table (1), it was found that the average D-Dimer values for patients before surgery reached (0.4263) mg/L with a standard deviation of (0.12588), and the average D-Dimer values for patients one week after surgery reached (2.089) mg/L with standard deviation (0.73325).

It was found that the value of the probability of significance P value = 0.000 < 0.05 which indicates that there is a statistically significant difference between the average D-Dimer values for patients before surgery and a week after surgery, and this difference is in favor of the D-Dimer values for patients a week after surgery.

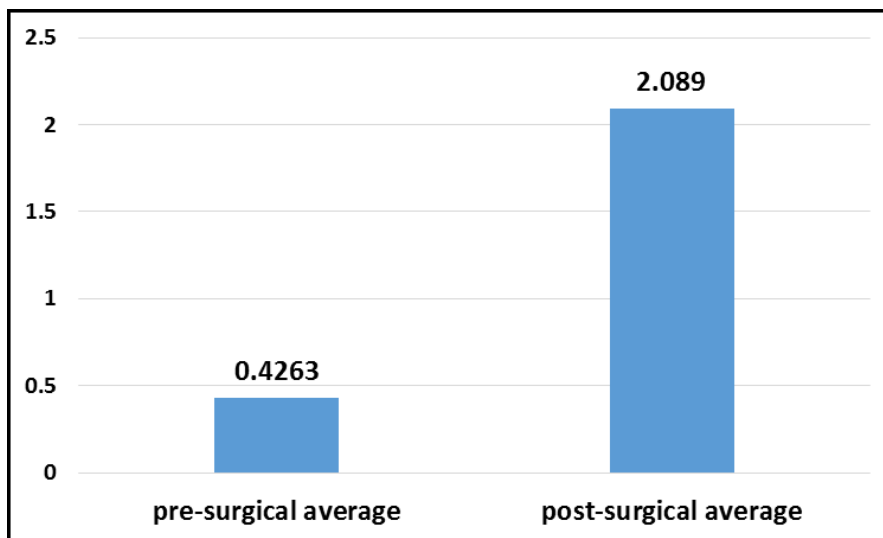


Figure 1: Chart of the difference between D-Dimer values for patients before surgery and one week postoperatively.

Comparison between the results of D-Dimer laboratory tests for patients immediately before surgery, with the control group.

A t-test was performed. test to determine the significance of the difference between the D-Dimer values of patients immediately before surgery, and the control group.

Table 2: T-test results for the difference in the results of D-Dimer laboratory tests For patients immediately before surgery, with the control group.

Group Statistics

	N	Mean	Std. Deviation	Std. Error Mean
pre-surgical	30	0.4263	0.12588	0.02298
Witness Group	30	0.2700	0.06576	0.01201

Independent Samples Test

T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
6.029	58	0.000	0.15633	0.02593	0.10443	0.20824

From Table (2), it was found that the average D-Dimer values for patients before surgery reached (0.4263) mg/L with a standard deviation of (0.12588), and the average D-Dimer values for the control group reached (0.2700) mg/L with a standard deviation. (0.06576).

that there is a statistically significant difference between the average D-Dimer values of the patients before surgery and the control group, and this difference is in favor of the D-Dimer values of the patients before surgery.

It was found that the value of the probability of significance P value = 0.000 < 0.05 and this indicates

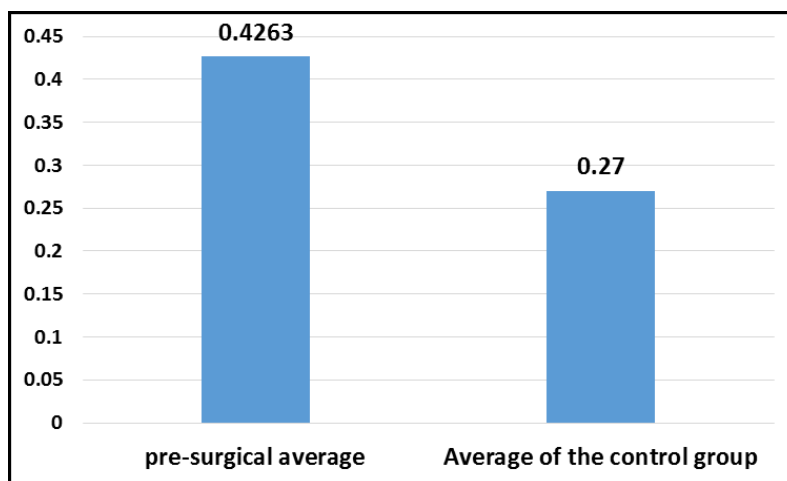


Figure 2: Chart of the difference between D-Dimer values for preoperative patients and the control group.

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

A t-test was performed, test to determine the significance of the difference between the D-Dimer values of patients one week after surgery, and the control group.

Table 3: T-test results. test for the difference in the results of D-Dimer laboratory tests For patients one week postoperatively, with the control group.

Group Statistics

	N	Mean	Std. Deviation	Std. Error Mean
post-surgical	30	2.0890	0.73325	0.13387
Witness Group	30	0.2700	0.06576	0.01201

Independent Samples Test

T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
13.533	58	0.000	1.81900	0.13441	1.54995	2.08805

From Table (3), it was found that the average D-Dimer values for patients one week after surgery reached (2.089) mg/L with a standard deviation of (0.73325), and the average D-Dimer values for the control group reached (0.270) mg/L with Standard deviation (0.06576).

It was found that the value of the probability of significance P value = 0.000 < 0.05 indicates that there is a statistically significant difference between the average D-Dimer values for patients a week after surgery and the control group, and this difference is in favor of the D-Dimer values for patients a week after surgery.

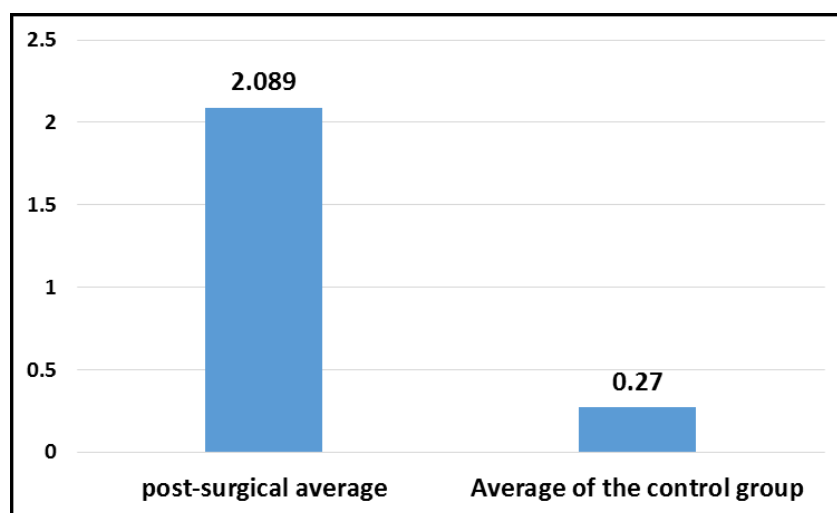


Figure 3: Chart of the difference between D-Dimer values for patients one week postoperatively and the control group.

CONCLUSIONS

1. T-test detection revealed that there was a statistically significant difference between the average D-Dimer values for patients before surgery and a week after surgery, and this difference was in favor of D-Dimer values for patients a week after surgery, and this indicates that laryngeal cancer surgery has led to an increase in D-Dimer levels in the blood.

There are several possible explanations for this increase

- Damage to blood vessels: Laryngeal cancer surgery can cause damage to blood vessels in the neck and throat. This damage releases clotting proteins into the bloodstream, leading to increased D-Dimer formation.

- Inflammation: Laryngeal cancer surgery can cause inflammation in the body, and inflammation also stimulates the production of clotting proteins, leading to an increase in D-Dimer.

- Blood clots: In some cases, laryngeal cancer surgery may cause blood clots in deep veins or arteries. These clots release D-Dimer into the bloodstream.

In addition, it is important to note that high D-Dimer values after laryngeal cancer surgery are not always a sign of a problem, D-Dimer levels may rise naturally in the weeks following surgery. However, if D-Dimer levels are significantly high or do not decrease over time, it may be a sign of serious complications.

2. T-test detection revealed that there was a statistically significant difference between the average D-Dimer values of the patients before surgery and the control group, and this difference was in favor of the D-Dimer values of the patients before surgery, and this indicates that laryngeal cancer patients have higher D-Dimer levels than healthy people.

There are several possible explanations for this difference

- Laryngeal cancer: Laryngeal cancer itself can also cause high D-Dimer levels because some types of cancer stimulate the production of clotting proteins.

- Inflammation: Laryngeal cancer can cause chronic inflammation in the body, as inflammation also stimulates the production of clotting proteins, leading to an increase in the D-Dimer.

- Other factors: There may be other factors that contribute to high D-Dimer levels in laryngeal cancer patients, such as: smoking, exposure to chemicals, and autoimmune diseases.

3. T-test detection revealed that there was a statistically significant difference between the average D-Dimer values for patients a week after surgery and the control group, and this difference was in favor of the D-Dimer values for patients a week after surgery, and this indicates that laryngeal cancer surgery has led to an increase in D-Dimer levels in the blood.

This finding suggests that D-Dimer levels may rise naturally in the weeks following surgery. However, if D-

Dimer levels are significantly high or do not decrease over time, it may be a sign of serious complications.

The previous results are consistent with studies of

1. Wenhan and et al study, which was conducted in the Department of Surgical Oncology at Affiliated Hospital in Shaanxi Province, China, and published in 2018, entitled Prognostic Role of Plasma D-Dimer in Patients with Solid Tumors: A Systematic Review and Meta-Analysis^[9], which aimed to evaluate the prognostic value of high D-Dimer level in patients with solid tumors. A comprehensive search of electronic databases was conducted until June 10, 2017, and studies were included that explore the relationship between pre-treatment plasma D-Dimer level and survival outcomes for patients in solid tumors. They concluded that serum D-Dimer analysis can provide useful information about prognosis in patients with solid tumors.

2. Cihan and et al study, which was conducted at the CATs Cancer Center in Vienna and published in 2012, entitled Elevated plasma D-Dimer levels and their association with poor prognosis in laryngeal cancer patients.^[13] Which aimed to determine the role of activation of hemostasis and fibrinolysis, which affects plasma D-Dimer levels in tumor patients. A prospective, controlled patient cohort study was conducted starting in 2003 at the Vienna General Medical Hospital. The study included (1178) patients with cancer, and they were followed up in the future. The average observation time for the study population was 731 days. The patients were divided into four groups according to the D-Dimer values, equally in terms of the number of patients in each group. They concluded that D-Dimer is a marker for Promising prognostic vitality, its high is associated with poor prognosis of survival and high death rates in oncology patients.

RECOMMENDATIONS

1. Further studies will be conducted to evaluate the performance of current D-dimer tests in diagnosing laryngeal cancer, and this will help determine the best tests for use in clinical practice.
2. More research is needed to understand the mechanisms behind high levels of D-Dimer in laryngeal cancer patients. This will help determine whether D-Dimer is a sign of cancer or plays a role in its development.
3. Study other factors that may affect D-Dimer levels, such as inflammation and blood vessel damage. This will help better interpret the results and identify patients who may have high D-Dimer levels for reasons not related to cancer.
4. The D-Dimer can be used with other tests to develop new diagnostic tools for laryngeal cancer. This may help diagnose cancer early, and then treatment will be more effective.
5. D-Dimer levels can be monitored after treatment to measure the patient's response to treatment, and this

may help determine whether treatment is effective and when treatment adjustments may be needed.

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