Research Article

Platelet Count Changes in Cancer Patients Under Radiation Therapy - A Prospective Study

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ABSTRACT

Normal platelet count ranges from 150,000 to 450,000 cells per microlitre of blood. Radiation therapy or radiotherapy is a therapy using ionizing radiation, generally as a part of cancer treatment to control or kill malignant cells. However normal cells are affected too including Thrombocytes/platelets. Radiation therapy may change the count, size and morphology of a platelet, but this study is aimed at changes in platelet count only. The Effectiveness, adverse effects and progressiveness of therapy can be estimated this way.

Keywords: Platelets, thrombocytopenia, radiation, apoptosis.

INTRODUCTION

A Carcinoma is a result of the mutations of the DNA that activate or deactivate the tumor suppressor genes. These may occur suddenly or as a result of being exposed to radiation or carcinogenic substances that are influenced by the genetic factor[1]. Any carcinoma or cancer is treated by the following radiotherapy, chemotherapy or a surgical procedure.

Radiation exposure can be acute or chronic, and the severity of symptoms depends on many factors, such as total dose, dose rate, distribution of dose, susceptibility of the person to radiation, and the type of organs (more radiosensitive tissues)[2,3]. Generally, high linear energy transfer (LET) radiation (alpha particles and fission fragments) is more efficient in inducing biological damage than low LET radiation (gamma ray, X-rays, and β-particles)[4]. This is because most of the incident energy will be deposited within a short distance, causing dense ionization[5, 6]. Ionising radiation breaks down and destabilizes the molecules, and this is particularly true for biomolecules, including DNA[7].The conventional view is that rapidly dividing cancer cells are more sensitive to ionizing radiation than normal tissue, and therapeutic radiation is therefore applied to induce apoptosis and other forms of cell death within a defined area while minimizing toxic effects on normal tissue around the treatment field[8]. However radiation also causes effect on other body cells like normal platelets etc[9].

Blood consists of different types of cells such as red blood cells, platelets, and five different kinds of white blood cells such as neutrophils, monocytes, basophils, eosinophils etc. A normal platelet counts ranges from 150,000 - 450,000 per micro litre of blood. Bone marrow suppression can arise after ionising radiation[10]. There are many factors that affect the frequency and severity of bone marrow suppression.

Platelets play a vital in coagulation of blood which is termed as hemostasis. Thrombocytopenia results from an abnormally low level of platelets[11]. Thrombocytopenia is common complication of radiotherapy that often cause treatment interruptions and increase the risks of bleeding[12]. When the platelet count is low, the treatment may be delayed or a lower dose is recommended until the platelet counts returns to a normal level. In a drastically low platelet counts platelet transfusion is given[13].

MATERIALS AND METHODS

The Platelet values of patients from 30-75 years of age undergoing palliative radiotherapy with 5 fractions are given below. Complete Blood Count reports were collected from a local cancer clinic with the consent of patients and the platelet counts were collected for 5 fractions. The technique of radiation used was 3DCRT technique for all the patients.

RESULTS

Throughout the radiotherapy the platelet counts can vary from 2.6-3.2 lakh cells per micro litre of blood. After the first, second, third, fourth and fifth fraction of radiotherapy the average range of platelets is from 3.3-3.8 lakh cells per micro litre, 2.1-3.6 lakh cells per micro litre, 2.6-3.1 lakh cells per micro litre, 2.5-3.1 lakh cells per micro litre and 2.2-3.8 lakh cells per micro litre respectively.

DISCUSSION

It is observed that even with the effects of radiotherapy there is no drastic decrease in platelet counts as the effect of bone marrow suppression due to radiotherapy is countered by platelet transfusions when the platelet levels are life threatening. A new platelet growth factor,

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Mpl ligand, is currently under evaluation in phase I trials[14].

Table 1: Results of platelet count changes in patients

samples	Age	Gender	Fraction 1	Fraction 2	Fraction 3	Fraction 4	Fraction 5
1	49	F	408000	258000	136000	169000	118000
2	62	M	257000	303000	361000	136000	42000
3	60	M	371000	396000	371000	352000	290000
4	40	F	318000	282000	156000	160000	132000
5	34	F	526000	331000	362000	352000	295000
6	63	M	309000	315000	282000	310000	250000
7	62	M	176000	192000	167000	155000	132000
8	30	M	187000	225000	223000	210000	190000
9	50	F	371000	356000	330000	352000	321000
10	60	F	451000	278000	250000	341000	390000
11	45	F	232000	250000	340000	418000	311000
12	53	M	455000	372000	360000	410000	396000
13	37	F	200000	233000	194000	260000	248000
14	75	F	358000	311000	289000	323000	367000
15	60	F	160000	405000	316000	158000	172000
16	45	F	645000	447000	458000	401000	357000

It is possible that such an agent could be useful in preventing or treating thrombocytopenia associated with radiotherapy and chemotherapy. An effective platelet growth factor could eliminate delays in radiotherapy due to thrombocytopenia and avoid the well-known risks of platelet transfusions derived from multiple donors[15].

CONCLUSION

Radiation exposure in cancer patients and its impact on platelets have been investigated for 16 patients. There is no drastic decrease in the platelet count, therefore it is least affected. The pathological complete response is yet to be analyzed by obtaining more than 50 patients.

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