



Review Article

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ANATOMICAL AND PHYSIOLOGICAL VIEW OF RAKTAVAHA SROTAS MOOLASTHANA: A REVIEW

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ABSTRACT

Srotas is defined as the channel for the transportation of dhatu and nourishes the other dhatu. The Raktavaha Srotas are responsible for the formation and transport of blood. Yakruth, Pleeha and Raktavahini Dhamaniyam are considered the Moolasthana. The Rakta Dhatu is formed by the union of essential parts of Rasa Dhatu and Aahara Rasa with the help of Ranjaka Pitta, transported through the Sira. Hematopoiesis is the lifelong process of continuous formation and turnover of blood cells; it is mainly intramedullary and extramedullary hematopoiesis. Intramedullary hematopoiesis occurs in the liver, spleen and bone marrow, while extramedullary hematopoiesis is a pathological condition in the liver and spleen.

Keywords: Srotas, Raktavaha Srotas, Yakrit, Pleeha, Rakta dhatu, hematopoiesis

INTRODUCTION

Srotas is a channel in which Rasa dhatu flows to nourish others' Dhatu. According to Dalhana, Srotas transport the materials helpful to informing another Dhatu. Usually it transports Prana, Anna, Jala, Rasa, Rakta and Mamsa and Meda. Srotas are various shapes like tubular, big or small, long and resemble a creeper with many branches.

The Raktavaha Srotas are responsible for the formation and transportation of blood. The Rakta vaha Srotas are the two in number, Yakruth, Pleeha and Raktavahini Dhamaniyam are the moolasthana. The Raktavaha Srotas dusti manifested by Cyanosis, fever, burning sensation, anaemia, haemorrhage, and subconjunctival haemorrhage ¹.

The hematopoietic system is responsible for producing mature blood cells, including organs and tissues such as the bone marrow, liver, and spleen. Blood is connective tissue and acts as a central transport system within the body. The formation of blood cells begins very early in embryonic life and continues throughout life.

LITERARY REVIEW

Classical review

The channel (Srotas) that carries Rakta (blood) spreads to the entire body. Acharyas have opined a different view on moolasthana (Table 1).

The Yakrit is one of the kosthanga⁴, which maintains the metabolic function of the human body. It is situated on the right and inferior to the Hridaya⁵. The Yakrit is the maternal derivatives (Matrijadi bhava)⁶, from the essence part of Rakta⁷.

Acharya Sushruta has compared the colour of Yakrit with the colour of Pittaja Arsha with Shukajihva, i.e., tongue of parrot⁸. It is also the site of Ranjaka pitta.

The Pleeha is a kosthanga situated below and left to the hridaya⁵. The Pleeha is developed from Matrijadi bhava and also derived from Rakta. Dhamani is the structure which nourishes the body and maintains the function of the body properly. In other versions, it is the structure which feels pulsation. Dhamani originated from Nabhi. It spreads like spokes of the wheel. It is 24 in number⁹. The Raktavahini Dhamani are the structure which carries Rakta to a different part of the body.

Contemporary review

The liver is the body's largest gland, both exocrine and endocrine, situated in the right hypochondrium, part of the epigastrium, and part of the left hypochondrium. The exocrine part secretes bile which conveys by the biliary passage; the endocrine part secretes glucose, heparin, and cholesterol. The liver cells undergo mitosis when the part of the organ is surgically removed. The liver presents five surfaces and one border. It is divided anatomically into the right (5/6th part) and left lobe (1/5th part) by falciform ligaments but physiologically divided into eight segments (from segment I to segment VII)¹⁰. The liver is formed by parenchymal cells, connective tissue stroma, sinusoid, bile canaliculi, numerous portal triads and tributaries of the portal vein. The hepatocytes are arranged in the classical hepatic lobule, portal lobule and liver acinus¹¹.

The spleen is highly vascular, friable, and purple and is situated in the left hypochondrium and partly epigastrium. It presents two ends- medial and lateral, diaphragmatic, and visceral surface, and anterior and posterior basal angle¹². The splenic parenchyma has

many units of red and white pulp; that surround the splenic artery and central arterioles. The white pulp contains T and B lymphocytes, while the red pulp comprises 75% of splenic parenchyma; contains venous sinusoids, consisting of macrophages¹³.

DISCUSSION

The Dhatus are the essence of Aahara rasa, which provides nutrition. Rakta dhatu is a vital part of the human body; it is also considered Pranayatana (seat of life)¹⁴. The Rakta dhatu is formed by the union of essence part of Rasa dhatu and Aahara Rasa with the help of Ranjaka pitta. When the Rasa dhatu reaches Yakrit and Pleeha, it turns red to¹⁵. The Rakta dhatu mainly located in Hridaya and circulates the whole body through the Sira, which is originated from Hridaya. Blood contains more than ten different lineages: leukocytes are responsible for innate and adaptive immunity; erythrocytes transport O₂ and CO₂, while megakaryocytes are produced platelets for clotting and wound healing. In the third week of embryonic life, the blood cells are formed from mesodermal cells. The mesodermal cells are aggregated to form Blood Island; temporary stem cells or hematopoietic stem cells are situated at the centre of Blood Island. These temporary cells are replaced by permanent stem cells in the liver. In the sixth month of intrauterine life liver first starts the formation of blood¹⁶. They also migrate from the liver to bone marrow (BM) around the time of birth because bone marrow is the ultimate destination of the hematopoietic system as the production hub for blood cells throughout life.

During pathological conditions, hematopoietic stem and progenitor cells leave their microenvironment in the bone marrow and establish in different anatomical locations where they continue to produce mature blood cells known as Extramedullary hematopoiesis (EMH). The main blood vessels in the adult liver are the portal and central veins and the hepatic artery¹⁷.

The spleen is a haemo-lymph organ belonging to the reticulum-endothelium system. During fetal life spleen produce erythrocytes and after birth, it produces lymphocytes. It is also a highly vascular organ which contains almost 1/3rd of the total body platelets and high amount of neutrophils¹⁸.

In the fifth month of intrauterine life, the hemopoiesis has permanently moved into the bone marrow, but some lymphocytes and plasma cells are developed from the white pulp of the spleen and other lymph tissues. The production of monocytes, granulocytes, erythrocytes, and megakaryocytes is produced entirely in the bone marrow¹⁹.

CONCLUSION

Hematopoiesis is the lifelong process in which the formation, development and maturation of blood cells occurs. This process occurs in two stages –the prenatal and postnatal period. Hemopoiesis occurs mainly in the liver and spleen during the prenatal period, but some cells develop in the thymus, lymph nodes, and red bone marrow. Most blood cells are produced in the red bone marrow; some white blood cells are produced in lymphoid tissue. Therefore, Yakrit and Pleeha are the producers of blood cells in intraembryonic life.

Table 1: Classical Review of Moolasthanana of Raktavaha Srotas

Acharyas' view	Moolasthanana of Raktavaha Srotas
Charaka view ²	Yakrit and Pleeha
Sushruta view ¹	Yakrith, Pleeha and Raktavahini Dhmaniyam
Vagbhata view ³	Yakruth and Pleeha

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