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EXPLORING THE AYURVEDIC PARADIGM OF HAEMOSTATIC MEASURES: A COMPREHENSIVE REVIEW ARTICLE

Deepak Kumar Singh*

Assistant Professor, Department of Shalya Tantra, K.L.S. Ayurvedic Medical College Lucknow, Uttar Pradesh.

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***Corresponding Author**
Deepak Kumar Singh
Assistant Professor,
Department of Shalya Tantra, K.L.S. Ayurvedic Medical College Lucknow,
Uttar Pradesh.

ABSTRACT

The *Raktadhatu* i.e., the blood is given greater importance in life sciences, especially in the field of surgery. *Acharya Susruta* has even considered it as an important *Dosha* as *Tridosha*s in the etiopathology of diseases, its curative measures and in maintenance of health. To prevent loss of this entity, *Acharya Susruta* has elaborately described this under a specific heading namely *Chaturvidha Rakta Sthambhana Upayas*, namely *Sandhana*, *Skandana*, *Dahana* and *Pachana*. *Sandhana* is applying *Kashayarasa Dravyas* in different forms, suturing, ligation, application of pressure and pressure bandages etc. *Skandhana* is application of cold by any means. *Pachana* is application of caustic ashes and alkalis. *Dahana* is to burn by different means. In above methods haemostasis is achieved by inducing vasoconstriction, coagulation, mechanical and physical obliteration of vessels. Thus *Skandana, Sandhana, Pachana, Dahana* are the absolute haemostatic measures, understanding of which will equip surgeons to face haemorrhage with every available resources.

KEYWORDS: *Raktadhatu, Rakta Sthambhana, Sandhana, Skandana, Dahana, Pachana, Haemostatic.*

INTRODUCTION

The *Raktadhatu* i.e., the blood is given greater importance in life science, especially in the field of surgery. *Acharya Susruta* has even considered it as important as *Tridosha*s in the etiopathology of diseases, its curative measures and in maintenance of health. He states 'the life is sustained by proper functioning of blood, and the body itself is rooted to *Rakta*. *Rakta* is life; hence it is to be protected by any means.[1] *Susruta Samhita* and other treatises of

Shalyatantra has given many measures to maintain and nourish *Raktadhatu* and to stop bleeding. *Acharya Susruta* the father of ancient surgery, was the first to name, classify and describe those under a specific heading namely *Chaturvidha Rakta Sthambhana Upayas.*

Haemorrhage is defined as the loss of blood from a damaged vessel. It is classified in to three types 1) Arterial haemorrhage 2) Venous haemorrhage 3) Capillary haemorrhage. In arterial haemorrhage, bleeding is bright red in colour, spurting as a jet which rises and falls in time with the pulse. In venous haemorrhage, it is darker red in colour, and has a steady and copious flow. Whereas capillary haemorrhage is of bright red in colour, often rapid, ooze. Further, based on the duration of haemorrhage, it is classified in to Acute, Chronic and Acute on chronic haemorrhages.[2]

Treatment of haemorrhage in general are aimed at 2 main outcomes: Stopping the blood loss and restoring the lost blood.[2] Similar concepts have been explained in ayurvedic treatises as well in detail.

Haemostasis[2]

Coagulation is the process by which blood changes its state from liquid to gel. It potentially results in haemostasis, the cessation of blood loss from a damaged vessel, followed by repair. There are three essential steps in blood coagulation: 1) A complex cascade of chemical reaction occurs in the blood involving more than a dozen blood coagulation factors in response to rupture of the vessels or damage to blood itself. As a result, the formation of a complex of activated substances takes place which collectively called as prothrombin activator. 2) The prothrombin activator catalyses conversion of prothrombin in to thrombin. 3) The clot is formed when thrombin acts as an enzyme to convert fibrinogen into fibrin fibers that enmesh platelets, blood cells, and plasma.

Haemostasis is achieved by Pressure; Packing; Position and rest; operative Procedures such as suturing, knotting and cauterisation; Also, by the use of local haemostatic agents like Gelatine sponge, Oxidised cellulose, Collagen sponge, Microfibrillar collagen powder, Topical thrombin, Bone wax, Gelatine matrices, Topical EACA and topical cryoprecipitate**.**

The haemostatic measures in *Ayurveda* are categorised under four headings by *Acharya Susruta* 1) *Sandhana;*2) *Skandana*; 3) *Dahana;* 4) *Pachana.* To be used as per severity and type in the order- *Skandana, Sandhana, Dahana, Pachana.*[3]

Skandanam

It is the first method of haemostasis through coagulation of blood by cold application.[4] This method can be used in visible bleedings and contusions externally. In the context of *Jaloukavacharana Atiyoga,* it is managed by pouring cold water (*Sheetabhiradbhihi Parisheka*) as first line of management.[5] This method is also told in bleeding haemorrhoids and ulcers.[6]

Sandhanam

The word *Sandhana* means 'to unite'. In this context that is to approximate wound edges. *Acharya Susrutha* describes that; it can be achieved by the use of *Kashaya Rasa Dravyas.* Mechanical method of wound approximation is suturing techniques.[4] Hence *Sandhana Karma* also includes application of pressure bandages, suturing, application of a haemostatic clamp to a blood vessel and ligation. As in *Jalouka Atiyoga* application of pressure bandage is told.[5] *Lodhradi* (*Priyangu* (*Callicarpa microphylla*), *Patanga* (*Caesalpinia sappan*), *Sarjarasa* (*Shorea robusta*), *Rasanjan* (Extract of *Berberia aristata*), *Salmalipushpa* (*Salmalia malbarica*), *Masa* (*Vigna mungo*), *Yava* (*Alhagi camelorum*)), *Hareetakyadi*, *Shalmali Piccha,* and *Panchavalkala Dravyas* are used here in the form of powders, paste, decoction etc., internally and externally as both local and systemic haemostatic agents.[4,7] This procedure may be useful in capillary haemorrhages, bleeding from peptic ulcers, tropical haemorrhages like abrasions, haemorrhage due to systemic illness like intracranial bleeding, bleeding disorders *(Raktapitta*) like thrombocytopenia etc.

Pachana

Pachana is the 3rd category of haemostatic measure i.e., to ripen or to digest by using the *Bhasmas* (ash). *Bhasma* of *Kshouma, Vastra* etc., *Mrutkapala, Anjana,* Mrudukshara*s* (mild caustic alkali preparations) like *Shanka, Shukti*, *Kapardhika, Spatika bhasmas* are used here.[4,7] This method can be used in capillary haemorrhages, sub-mucosal haemorrhages, tropical haemorrhages etc.

Dahana

Superior most among all four, if haemostasis is not achieved by above methods *Agnikarma* is the definitive option.[4] The word *Dahana* means burning or cauterizing. *Dahanopakaranas* like *Agnikarma shalaka*, *Taila, Guda, Sneha* are used. Such references can be found in *Kadara Chikitsa* i.e., excision followed by *Taila Dahana* in order to obliterate the feeding

vessel and achieve haemostasis.[8] And in amputations *Tailadi Dahana* is told to manage excessive bleeding.[9] Now a days, electric thermal cautery is used widely.

Combined use of above measures is told in most of the situations. Astringent powders and application of pressure with hand and bandaging, Simultaneous use of both Pachana and, Skandhana Dravyas. Pressure bandages anointed with bee wax etc. and Dahana with Tapta Shalaka (red hot metallic instrument) are told in scattered references.[5,6,7]

DISCUSSION

Even though there are clinical evidences for the efficacy of these Raktasthambhana Upayas, it is very much in need to understand the mode of action of above measure. That would aid the judicial and appropriate use of these haemostatic methods.

The application of cold reduces the blood flow and capillary permeability by causing vasoconstriction of arterioles enabling coagulation of blood and there by achieving haemostasis.

In Sandhana, when mucous membrane or tissue exposed to astringent drugs if taken internally may causes shrinkage and are often used to check discharge of blood, serum or mucous secretions. Similarly, externally applied astringents cause mild coagulation of skin proteins, dry, harden, and protect the skin. In present practices some of the astringent drugs like Alum [KAl (SO4)2] is common drug administered as a local application to stop the bleeding in dental surgeries. Similarly, the astringent drugs described in the Sandhana Karma may have the effects like vasoconstriction or stimulating the prothrombin net formation which helps in trapping the platelets at the site of injury or absorb water from the tissue or helps in reducing the bleeding time. Suturing techniques, Ligation and pressure bandages are acts by creating a mechanical obliteration of vessel lumen.

The application or dusting of the Bhasma/Ksharas in the affected area told under Pachana Karma, may digest protein in the local tissue which stimulates coagulation of the blood as in bleeding haemorrhoids. Along with the chemical properties, both Skandana and Pachana also acts as physical inhibiter similarly as bone wax and gelatine matrices.

The procedure Dahana increases the local temperature which causes coagulation necrosis of tissue protein and leads to obliteration of blood vessels. Further it helps in clotting of the blood.

Along with absolute haemostatic measures, replacement of lost volume and nutritional supplements contributing to haemopoiesis also has been taken cared by ancient surgeons of India. Intake of cold water, cold decoctions prepared with sweet and astringent drugs, jaggery, honey, sugarcane juice, milk, meat soups etc., which are rich in glucose, proteins, potassium, sodium, magnesium, iron and many other minerals and nutrients has been told.

CONCLUSION

Surgeons have to always face haemorrhage, mild to severe in their day-to-day practice as a daily encounter. The detailed analysis of literature would reveal that, the main two objectives of management of haemorrhage have been well understood, addressed and documented by Ayurvedic surgeons, especially by Acharya Susruta, i.e., to achieve haemostasis and to restore the lost blood. The haemostatic measures told in classics of *Shalyatantra*, the *Chaturvidha Rakta Sthambhanopaya* are highly scientific, practical, effective and still holds good in this 21st century, the era of advanced technologies. Thus *Skandana, Sandhana, Pachana, Dahana* are the absolute haemostatic measures, understanding of which will equip surgeon to face haemorrhage with least available resources.

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