

A STUDY OF *BAHYA VIDRADHI* IN *BRIHATRAYEE* WITH RECENT ADVANCEMENT IN DIAGNOSIS AND MANAGEMENT OF PYOGENIC ABSCESS

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ABSTRACT

Vidradhi is one of the most dreadful diseases faced by the mankind from the ancient times. Management of *vidradhi* was a bigger issue in all ancient civilization including Indian Civilization. The aetiopathogenesis, types, clinical presentation, complication and management of *vidradhi* is described in all *Brihatrayees* of Ayurveda namely *Sushruta Samhita*, *Charak Samhita* and *Vagbhat. Sushruta Samhita* the pioneer book on surgical discipline of hindu civilization described vividly about the *vidradhi* in *Sutrasthan*, *Nidan sthan* and *Chikitsa sthan* for about *Nidan* "(Etiology), *Samprati* (Pathogenesis), *Roopa* (Clinical feature), *Updrava*

(Complication) and *Chikitsa* (both surgical and medicinal way). Considering the etiology, pathogenesis, clinical presentation and management, different kinds of *vidradhi* can be correlated with inflammation to formation of abscess. In this review, approach has been made to understand *Bahya Vidradhi* (Pyogenic Abscess) with the help of knowledge found in *Brihatrayee* and the recent study and investigations available in modern medical science.

KEYWORDS: *Bahya Vidradhi*, *Vidradhi*, *Brihatrayee*, Pyogenic Abscess.

INTRODUCTION

Ayurveda the Indian Cultural heritage for health care considered the collection of pus inside cavity in terms of *vidradhi*. In all *brihatrayee* of Ayurveda namely *Sushruta Samhita*, *Charak Samhita* *Astanga Hridaya* and *Astanga Sangraha* description of *vidradhi* counts in terms of etiopathogenesis, clinical presentation, stages of management &

complication. Ayurveda broadly divided management of a diseases either by medicine and surgical method or both. *Vidradhi* is such a diseases which can be treated with medicine in the initial stage and surgical way in the *pakwa* stage. Many of the surgical diseases in details with their management are described in Sushruta Samhitha elaborately. *Vidradhi* is one such disease. "*Sheegra Vidhahitvat*"^[1] definition of *Vidradhi* in Charak Samhita itself suggests the virulence of the disease. *Vidradhi* word is evolved from word *Vidra*, i.e. a painful condition like pricking, puncturing or stabbing the skin. Aggravated *doshas* vitiate the skin, blood, muscle, fat and bone tissues; get localized and produce a troublesome swelling, which slowly bulges up, is deeply rooted, is painful and round. This is *Vidradhi*. *Vidradhi* can be of two types *Abhyantar* and *Bahya*.

Acharya Susruta has mentioned *Trivid Karma*^[2] for the management of *pakwa vidradhi* in the *Sutrasthan* Chapter no 5. They are –*Purva karma*, *Pradhan karma* and *Paschat karma* which is very much similar with modern surgical steps, i.e. Pre-operative, Operative and Post Operative management.

Management of *Vidradhi* (Abscess) depends upon the stages of *vrana sotha*, and once there is collection *Puya* (Pus), which is considered as *doshas* to be drained out through different technique which is the main principle of treatment. Considering the etiology, pathogenesis, clinical presentation and management, different kinds of *vidradhi* can be co-related with inflammation to formation of abscess and *Bahya Vidradhi* can be co-related with different Pyogenic abscess.

AYURVEDIC REVIEW

Paribhasha (Definition)

Acharya Susruta has vividly described *Vidradhi* as *mahamoola* (deep seated), *rujawanta* (painful), *vrittam* (round) or *aayatam* (extended) swelling which occurs due to extremely deranged and aggravated *vata*, *pitta* and *kapha doshas* which vitiate the *Twacha*, *Rakta*, *Mamsa*, *Meda* and even *Asthi*. It is of 6 type.^[3]

According to *Acharya Charak*, *Vidradhi* is formed by vitiated blood which is formed in large quantity and it gets quickly suppurated (*Paka*), that is why it is called *Vidradhi*.^[1]

According to *Astanga Hridaya* & *Astanga Sangraha* the vitiated dosha produces a swelling arising from them; either outside or inside the body situated deep inside

accompanied with severe pain; being either round or wide, this is known as '*Vidradhi*'.^[4,5]

Nirukti

Which causes *daha* i.e. burning sensation is called as "*Vidradhi*".

Bheda or Prakara

Vidradhi is grossly divided into two types by *Acharyas*. This classification is based on *Rogamarga*.

I. *Bahya* (*Bahya Rogamarga*)

II. *Abhyantara* (*Abhyantara and Madhyama Rogamarga*)

Bahya Vidradhi: *Bahya Vidradhi* Is Again Divided Into 6 Types An Basis of Doshas.

Classification Of *Bahya Vidradhi*

Type	Su	Ch	AH	AS
<i>Vataja</i>	+	+	+	+
<i>Pittaja</i>	+	+	+	+
<i>Kaphaja</i>	+	+	+	+
<i>Raktaja</i>	+	-	+	+
<i>Sannipataja</i>	+	+	+	+
<i>Kshataja</i>	+	-	+	+

Nidana

Sushruta Samhita

Acharya Sushruta has mentioned *nidan* of aggravation of different kind of doshas in *vrnaprassana adhyaya* which can be considered as the *samanya nidana* of *Bahya vidradhi*.

***Vataja*^[6]**

Ahara: Intake of *Kashaya*, *Katu*, *Tikta*, *Laghu*, *Ruksha*, *Sheeta*, *Shushka Shaka* and *Mamsa*, *Varaka*, *Udhalaka*, *Khoradusha*, *Shyamaka*, *Neevara*, *Mudga*, *Masoora*, *Harenuka*, *Khalaya*, *Nishpava*, *Upavasa*, *Vishamashana*.

Vihara: *Balavadvigraha*, *Ativyayama*, *Ati vyavaya*, *Ati Adhyayana*, *Prapatana*, *Pradhavana*, *Prapedana*, *Abhigaatha*, *Langhana*, *Plavana*, *Pratarana*, *Raatri jagarana*, *Bharaharana*, *Gaja*, *Turaga*, *Ratha Atiyaana* and *Paada Aticharana*. *Vegavidharana* particularly *Mootra*, *Vit*, *Shukra*, *Chardi*, *Shavathu*, *Udgara*, *Ashru* etc.

***Pittaja*^[7]**

Ahara: Intake of *Katu, Amla, Lavana, Teekshna, Ushna, Laghu, Vidhagda, Vidhahi, Tila taila pinyaka, Kulatha, Sarshapa, Harita Shakha, Matsya, Javika mamsa, Dadhi, Takra, Kurchika, Masthu, Souveeraka, Sura vikara, Amla phala* etc.

Vihara: *Krodha, Shoka, Bhaya, Aayasa, Upavasa, Ati maithuna.*

***Kaphaja*^[8]**

Ahara: Intake of *Madhura, Lavana, Sheetha, Guru, Snigdha, Abhishyandi, Phichila and Srotorodhakara Ahara, Hayanaka Yavaka Naishadha, products of masha, Mahamasha, Ghodhuma, Taila, Pishta vikriti, Dadhi, Dugdha, Krushara, Payasa, Ekshu vikara, Anoop and Audhuka Mamsa, Vasa, Kamalanala, Kaseruka, Shringataka, Madhura and Valli Phala, Samashana and Adhyashana.*

Vihara: *Divaswapna, Avyayama and Alasya.*

Raktaja

Ahara: Continous intake of *Pitta prakopaka karana, Drava, Snigdha, Guru ahara.*

Vihara: *Divaswapna, Krodha, Anala and Atapa sevana, Parishrama, Abhigatha, Ajirna, Virudhashana, Adyashana.*

***Kshataja*^[9]**

Those who indulge in unsalutary diets and habits, if get a (closed) injury or an open wound caused by their respective agents, in them *vayu* induces heat of the injury to vitiate *pitta* alongwith *sonita*.

Charak Samhita

Charak has not mentioned the *nidana* of *bahya vidradhi*.

***Astanga Hridaya & Astanga Samgraha*^[10,11]**

Astanga Hridaya & Astanga Samgraha has listed up the causative factor for *Abhyantara* and *Bahya vidradhi* together.

Ahara: *Paryushit* (kept over night), *Atiushna, Atiruksha, Atisuska, Vidahi.*

Vihara: *Jihma shayya* (lying on uneven bed), *Vicheshta*(improper movement of the body parts) and those (*ahara* and *vihara*) which cause vitiation of *Rakta*.

Samprapti

Nidana sevana causes aggravation of the *Doshas* which in turn vitiates the *Twacha*, *Rakta*, *Mamsa*, *Meda* and *Asthi* and get localized at some place produce a slowly bulging up troublesome swelling, deeply rooted, painful, rounded or else elongated called as '*Vidradhi*'.^[12]

Indulging in *Nidanas* and factors which vitiates *rakta*; cause vitiation and aggravation of the *doshas* which in turn causes vitiation of *Twacha*, *Mamsa*, *Meda*, *Asthi*, *Snayu*, *Kandara* produce *Vidradhi*.^[13]

For *Kshataja Vidradhi*, *Acharya Susruta* and *Vagbhata* explained quite different *Samprapti*.

By trauma, or indulging in unsuitable food and activities, the *ushma*(Heat) of the assault or wound dispersed by *Vata*, aggravates *Rakta* and *Pitta* and gives rise to fever, thirst, burning sensation and other symptoms of abscess of *Pitta* origin.^[9]

Vata getting aggravated by trauma or incompatible foods etc. and by displacing the *usma* (heat) at the site of trauma, laeds to Vitiation of *dosha* the aggravation of *pitta* and *Rakta* and gives rise to *vidradhi*, presenting symptoms of *Pitta* and *Rakta* and producing *Upadrava* (complications).^[14]

Roopa

Features of *vidradhi* are of two types general and specific. The general symptoms were a) intense pain is because of vitiated *Vata* b) *Daha* i.e. burning sensation is because of vitiated *Pitta* c) *shopha* i.e. swelling is due to *Kapha* d) redness or *raga* is due to vitiated *Rakta* e) *Paka* occurs by vitiated *Tridoshas* along with *Rakta*.^[12]

Different Clinical Features of Bahya Vidradhi According to Dosha In Brihatrayee.

	Characteristics	<i>Charak</i> ^[15]	<i>Sushruta</i> ^[16]	<i>Astanga Hridaya</i> ^[17]
Vataj	VARNA	Aruna/ Krishna	Aruna/Krishna	Shyava/Aruna
	AAKAR	Kathora	Parusha	Vishama
	VEDANA	Vyedha Cheda	Atiatha	
	PRAPAKA KALA	-	Chitrautthan	Chitrautthan
	SRAVA	Tanu, Ruksha, Aruna, Syava, Phenila,	Tanu	
	OTHER QUALITY	Bhrama, Anaha, Sabdasphurana		Vyadha, Cheda type of pain

		<i>Sarpane</i>		<i>Bhrama, Anaha, Spandan, Spadawan</i>
<i>Pittaj</i>	<i>VARNA</i>		<i>Pakvodumba-- asamkas, Shyava</i>	<i>Rakta, Tamra, Asita</i>
	<i>AAKAR</i>		-	-
	<i>PRAPAKA KALA</i>		<i>Kshiprautthana</i>	<i>Kshiprautthana</i>
	<i>OTHER QUALITY</i>	<i>Trishna, Daha, Moha, Jwara</i>	<i>Dahawan</i>	<i>Trina, Moha, Jwara, Dahawan</i>
	<i>SRAVA</i>	<i>Tila, Masha, Kulathaudak</i>	<i>Pitta</i>	
<i>Kaphaja</i>	<i>VARNA</i>		<i>Pandu</i>	<i>Pandu</i>
			<i>Sarawsadhrisya</i>	
			<i>Chiotutthan</i>	
	<i>SRAVA</i>		<i>Shita</i>	
	Other Features	<i>Jrimbha, Utklesha, Aruchi, Stambha, Shita,</i>	<i>Shita, Stabdha, Alpavedna, Sakandu</i>	<i>Sautklesha, shita, Stambha, Jrimbha, Arochak, Gaurav</i>
<i>Sannipatik</i>	<i>VARNA</i>	-	<i>Nanavarna</i>	<i>Sankirna</i>
	<i>AAKAR</i>	-	<i>Ghatalo, Vishmo, Mahan</i>	
	<i>PRAPAKA</i>	-	<i>Visham Pachyate</i>	
		-	<i>Nanaruja, Nanasrava</i>	
		-		
<i>Raktaja</i>	<i>Varna</i>	-	<i>Krishnasphota, Syava, lakshan of pitta vidradhi</i>	<i>Krishnasphota, Syava, lakshan of pitta vidradhi</i>
	Other Features	-	<i>Tivra daha, jwara. Ruja</i>	<i>Tivra daha, jwara .Ruja</i>
<i>Aagantuja</i>		-	<i>Features of Rakta and pitta VIdradhi</i>	<i>Features of rakta and pittaja vidradhi</i>
		-	<i>Jwara, Trishana and daha</i>	

Clinical Features A/C To Different Stages of Vidradhi

Sushrutha signifies the importance of diagnosis of unripened i.e. *ma*, ripening i.e. *Pachyaman*, ripened i.e. *Pakva* conditions of *Vidradhi*, by saying that physician who can identify *Ama* and *Pakva Lakshanas* of *Vidradhi* is real *Vaidya*, others are quacks.^[20]

Lakshanas^[18]

Amavastha: Slightly rise of temperature of the area, normal colour of the skin, cold inflammatory swelling, induration, dull pain and swelling are the lakshanas of *Amavastha*.

Pachyamana avastha

In *pachyamanavastha*, various types of pain such as pricking by needles, being bitten by ants, as if the ants are moving all over the body, being cut by sharp instrument or weapons, torn by speares, striking with stick, pressing with hand, rubbing with fingers, being burnt or cooked with fire or caustic, generalized heat and sucking pain occurs.

The patient gets no relief in standing, sitting and lying position, as if stung by scorpion. The site of inflammation gets swell up like an bladder, discolouration of skin, advanced swelling, associated with fever, burning, thirst and anorexia is seen.

Pakva Awastha

In *Pakvavastha*, there is relief of pain, paleness, decreased inflammation, appearance of wrinkles, scaling of skin, depressed in appearance, rising again after pressing with finger, movement of pus as in bladder so that, by pressing one end it moves to other side. Frequent pricking pain, itching, elevation and desire for food.

Bahya Viradhi Chikitsa

All varieties of *vidradhi*, which are in *ama avastha* and *pachyaman avastha* (unripened stage) should be treated by the same procedures as that of *Shopha*. In *Amapakveshaneeya Adhyaya*, Sushrutha explains *Saptopakramas* for *Shopha*.^[19]

UPAKARMA		AVASTHA
<i>Vimlapanam</i>	Dissolution of the inflammatory swelling by pressing with fingers	Amavastha
<i>Avasechanam</i>	Blood letting by jaluka etc.	Amavastha
<i>Upanaaha</i>	Poultice for ripening	Pachyamanavastha
<i>Patana kriya</i>	Operative procedure.	Pakvavastha
<i>Shodhana</i>	Debridement of slough or cleaning of the Wound.	Vrana
<i>Ropana</i>	The drugs are used which enhances Healing	Vrana
<i>Vaikritapaham</i>	To bring normal pigmentation	Vrana

First three *Upakramas* are for *Vranashotha*. Fourth is *Shastrakarma*, while last three are for *Vrana*.

In *Astanga Hridaya* the treatment of *Vrana* starts from its *Sophaawastha* Acharya Vagbhata has mentioned the following procedures for bursting or to turn *Pakvaawastha* of *Vrana*.^[20]

They are *Sodhana* (Purification therapy)

- *Raktamokshana* (Mainly Jaloka Avacharana)
- *Lepana* (Paste application)
- *Pradeha* (Thick warm poultice)
- *Nirvapana* (Application of Veshabara)
- *Upanaha* (Poultice)
- *Darana* (Mild squeezing)
- *Pidana* (Squeezing)

Dosha Wise Treatment Module

***Vataja Vidradhi*^[21]**

Amavastha: In an *vidradhi* due to *vata*, a thick lukewarm thick plaster containing the of the roots of the *vata*-allaying drugs with *ghrta*, oil and fat should be used.

Pachyamana: For poultices, meats of swampy and aquatic animals together paste with the drugs of *kakoli* group and barley and processed with *kanji* and fats should be used; *veśavara*, *krśara*, milk, and rice pudding should, regularly be used for sudation therapy; blood-letting should also be done.

Pakva: If with the above treatment, it moves towards ripening then *bhedan karma* should be done. After *bhedan karma* of *vidradhi* it should be treated as *vrana*.

Vrana: The wound should be washed with decoction of *Panchamoola* and filled with medicated oils prepared with predominantly salty and mixed with *Bhadradarvadi* drugs and *Madhuka*.

***Pittaja Vidradhi*^[22]**

Ama: *Vidradhi* caused by *Pitta* should be pasted with *Sharkara*, *Laja* and *Madhuka* mixed with *Sariva* all pounded with milk or *Payasa*, *Usira* and *Chandana*. It should be irrigated with decoctions, cold infusion, milk and sugarcane juice or with *Ghrta* cooked with *Kakolayadi* drugs mixed with sugar.

Pachyamana: Powder of *Trivrit* and *Haritaki* should be licked by adding plenty of honey; blood letting should be done with leeches.

Pakva: Even after the above treatment *Vidradhi* moves to *Pakvavastha* then is obtained then *bhedan karma* should be done.

Vrana: After washing with decoction of milk trees or of aquatic plants it should be pasted with pounded *Tila taila* and *Yastimadhu* with honey and ghee, bandaged with thin cloth piece. Ghee cooked with *Prapaundarika*, *Manjistha*, *Madhuka*, *Usira Padmaka*, and *Haridra* along with milk is good for wound healing. Similarly *Karanjadi Ghrita* pacifies vitiated wounds, cleanses sinuses and accidental wounds.

***Kaphaja Vidradhi*^[23]**

Ama: Abscess caused by *Kapha* should be fomented continuously with heated bricks, sand, cold cow-dung, husk dust and cowurines in *Amavastha*.

Pachyamana: In these *Avastha* impurities should be eliminated with frequent intake of decoctions, through *vaman karma* and poultices and blood-letting with gourd.

Pakva: When *Pakvavastha* is obtained it should be incised. It should be washed with decoction of *Argwadhadi* drugs.

Vrana: Wound should be filled with *Haridra Trivrit*, parched grain flour and sesamum with honey and bandaged properly as mentioned. Oil cooked with *Kullatika*, *Danti*, *Trivrit*, *Shyama*, *Arka*, and *Tilwaka* along with cow's urine and rock salt should be used.

***Raktaja Vidradhi*^[24]**

Vidradhi caused by blood should be managed with all procedures as prescribed for *Pittaja Vidradhi*.

***Kshataja Vidradhi*^[25]**

Vidradhi caused by extraneous factors should be managed with procedures prescribed for *Pittaja Vidradhi*.

***Bhedan Karma Procedure*^[26]**

Purva karma

Purva karma is the pre-operative stage which includes.

1. *Roga* and *Rogi pariksha*
2. Preparation of the patient by doing the eleven *upakrama* from the sixty *upakrama* starting

from *Langhan* to *Virechan*.

3. *Nirjantukaran*,
4. *Aaswasan*
5. Consent of the Patient.
6. Collection and preparation of the drugs, and preparation of the *Aturagar* (Operation theatre)
7. Light Diet

Pradhan Karma

For *Vidradhi*, *Bhedan* is considered as the *pradhan karma*.

1. *Sangyahan* by *madyapan*.
2. The Incision should be made in *Anuloma* direction until pus comes out.^[27]

Exact site for *Bhedan Karma*

1. In whichever direction the track leads and wherever pockets are present at all those incision should be made so that no morbid elements remain.^[28]
2. In case one incision is not enough to clear the wound completely counter incision should be given at some distance.^[31]

Different types of incision according to site of abscess^[29]

1. *Tiryak*: eye brow, cheek, temple, forehead, eyelid, lip, gum, axilla, belly and the groin.
2. *Chandramalndalakar*: hands and the feet.
3. *Ardhachandrakar*: The anus and the penis.

***Paschat Karma*^[30]**

The patient should be reassured after sprinkling cold water over him.

Pressure should then be applied all around by fingers and the wound is squeezed.

Shodhan Karma

Vrana shodhana dravyas mentioned in classical texts of Ayurveda which are used as primarily for cleaning of wound in form of decoction, *ksharodak* either it for the aim to reduce microbial load or to remove dead, necrotised tissue which are responsible to infection.

Ropana Karma

The management of *vrana* as per Ayurveda involve; healing of *vrana* which described as *Ropana* at various stage of *vrana*.

Ropana process helps to heal *vrana* at its various growing stage.

Bandhana

Different *Bandhana* procedure has been said for different *vrana*.

After *Bhedan Karma* i.e. Incision & Drainage Sushruta has opined to treat the *vidradhi* as *dusta varna* and has suggested various ways for management of *Vrana*.

Modern Review**Defination^[31]**

When acute bacterial infection is accompanied by intense neutrophilic infiltrate in the inflamed tissue, it results in tissue necrosis. A cavity is formed which is called an abscess and contains purulent exudate or pus and the process of abscess formation is known as suppuration. The bacteria which cause suppuration are called pyogenic.

Types

There are three varieties of abscess seen in surgical practice,^[32]

1. Pyogenic abscess
2. Pyaemic abscess
3. Cold abscess

1. Pyogenic Abscess

Pyogenic abscess is commonest variety of abscess, which is formed by bacterial infection. Microorganism enters the body by four ways.

- 1) Direct infection from outside.
- 2) Local extension of infection from adjacent focus of infection.
- 3) Lymphatics.
- 4) Blood stream or haematogenous.

Pathology

Pyogenic abscess is one of sequels of acute inflammation. Hence, before dealing with evolution of abscess, the study of inflammation is necessary.

Inflammation

Definition^[33]

Inflammation is defined as the local response of living mammalian tissues to injury from any agent. It is a body defence reaction in order to eliminate or limit the spread of injurious agent, followed by removal of the necrosed cells and tissues.

Causes^[34]

The causes of inflammation are as below.

- 1) Physical injury
 - Mechanical Trauma
 - Heat/ Cold
 - Radiation
- 2) Chemical injury
 - Inorganic poisons
 - Organic poisons
- 3) Infective
 - Bacteria
 - Viruses
 - Parasites and their toxins.
 - Fungi
- 4) Immune reaction
 - Antigen antibody reaction
 - Cell-mediated
- 5) Inert materials such as foreign bodies

Clinical Features of acute inflammation^[35]

The Roman writer Celsus in 1st century AD named the famous 4 cardinal signs as-

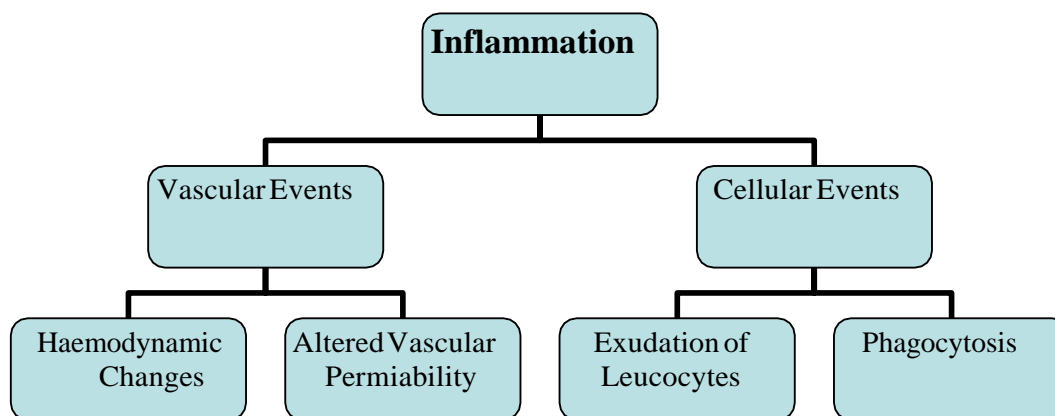
- Tumor Swelling
- Rubor Redness
- Calor Heat
- Dolor Pain

To these, Functio leasa- Loss of Function was added later by Virchow.

Types

Events in Inflammation: There are various changes taking place in inflammation, which are interrelated to each other. Main steps of inflammation are as follows.

- 1) Hyperaemia
- 2) Exudation
- 3) Emigration of leucocytes
- 4) Chemotaxis
- 5) Phagocytosis



Vascular Changes^[36]

1. Hyperaemia

The hyperaemia in inflammation is associated with well-known microvascular changes, which occur in Lewis triple response.

- Flush
- Flare
- Weal

It is an transient (lasting only for seconds) vasoconstriction followed at first by capillary dilatation ending in arteriolar vasodilatation.

2. Changes in vascular Permeability

Increasing vascular permeability leads to the movement of protein-rich fluid and even blood cells into the extravascular tissues. This in turn increases the osmotic pressure of the interstitial fluid, leading to more outflow of water from blood to tissue which produces tissue oedema.

3. Exudation

The microvasculature becomes more permeable which increased passage of protein rich

fluid through the vessel wall into the interstitial tissue. It explains Weal in Lewis triple response.

By exudation dilution of toxin occurs. Increased globulin plays protective antibodies role. Fibrin deposits help to limit spread of bacteria and it is also important in wound healing. Chemical mediators in initial phase of inflammation give rise to endothelial contraction and increases permeability by which leak of protein takes place according to their size. Albumin (Smallest) is found more while fibrinogen (largest molecule) less, at the site of wound.

- Interstitial tissue protein increases which increases tissue osmotic pressure by which oedema increases.

Cellular Events^[36]

1) Emigration of Leucocytes.

2). Chemotaxis.

The transmigration of leucocytes after crossing several barriers (endothelium, basement membrane, perivascular myofibroblasts and matrix) to reach the interstitial tissues is a chemotactic factor-mediated process called chemotaxis.

3) Phagocytosis

Phagocytosis.

Phagocytosis consists of three steps

- 1) Recognition and attachment of the particle to the ingesting leukocyte.
- 2) Engulfment, with subsequent formation of a phagocytic vacuole; and.
- 3) Killing and degradation of the ingested material.

Phagocytosis Follows

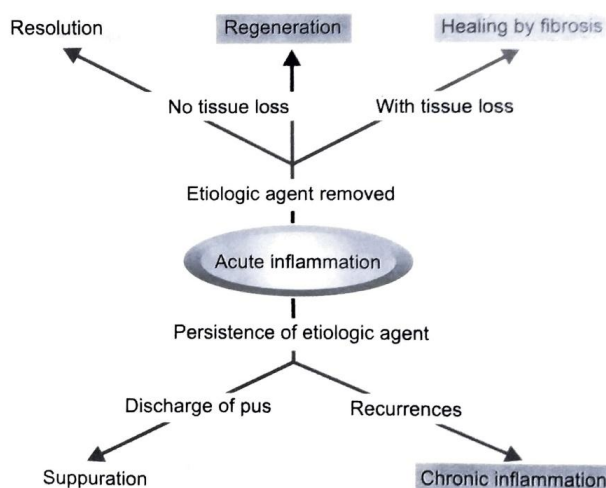
- 1) Intracellular destruction of phagocytosed microbes and dead cells by substances produced in phagosomes, including reactive oxygen and nitrogen species and lysosomal enzymes.
- 2) Liberation of substances that destroy extracellular microbes and dead tissues, which are largely the same as the substances produced within phagocytic vesicles.
- 3) Production of mediators, including arachidonic acid metabolites and cytokines, that amplify the inflammatory reaction, by recruiting and activating more leukocytes.

Fate of Polymorphs.

1. Successful in phagocytosing and killing microorganism by which polymorphs are degranulated.
2. Polymorphs may fail to kill due to resistant bacteria.
3. Polymorph die and cell membrane disintegrates, living bacteria to cause further damage'

Fate of Acute Inflammation^[37]

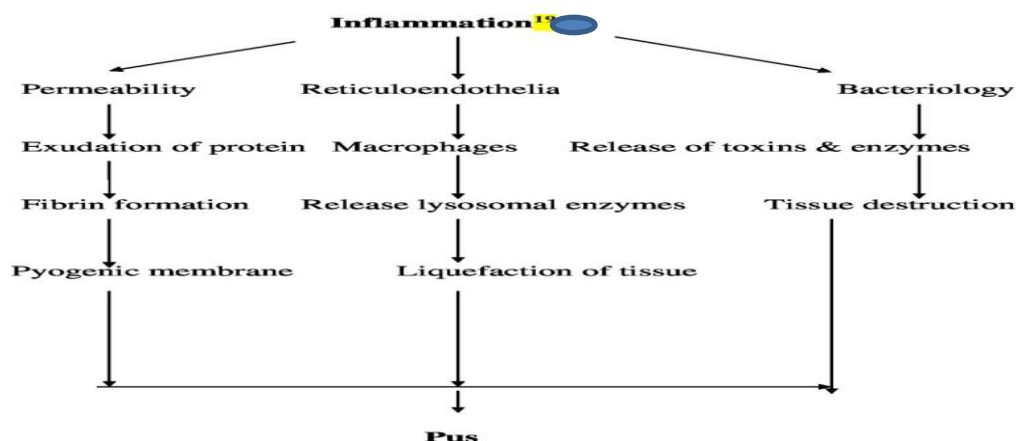
The following schematic diagram shows that the acute inflammation can resolve or suppurate or undergo repair or undergo fibrosis and or can lead to chronic inflammation. As abscess is result of suppuration we will see it in detail.



Suppuration

Suppuration means formation of pus and where pus accumulates it is abscess. Pus is thick, creamy yellow fluid, which on centrifugation separates.

Pathophysiology of ABSCESS^[38]



Steps of Pyogenic Abscess Formation

- 1) Microorganism invades particular tissues and further necrosis occurs and inflammation sets in.
- 2) Hyperaemia increases and there by swelling. In centre polymorphs and bacteria are packed.
- 3) Pus formation in central zone takes place, oedema increases, thinning of epidermis occurs. Pyogenic membrane covers the abscess.
- 4) In this stage abscess is incised and pus is drained.
- 5) Swelling surrounds as induration and cavity collapse healing processes starts.
- 6) Organization and fibrosis proceeds to give rise to fibrosis.

Common organisms in formation of abscess

The microorganisms are prime cause for formation of abscess in the body. More the virulence of bacteria more is the destruction of healthy tissues. Neutrophils form the pus. Study of microorganisms would not be out of context to deal with common organisms producing abscess.

They are enlisted below^[39]

1. *Staphylococci aureus*
2. *Streptococci*
3. *Escherichia coli*
4. *Klebsiella*
5. *Genus proteus*
6. *Pseudomonas aeruginosa*.
7. *Bacillus subtilis*

Clinical Features^[40]

Temperature is elevated. Occasionally when infection is more, fever with chill or without chill rigor can be present.

Local

Five classical local signs are due to hyperemia and inflammatory exudates.

- 1) Heat or calor :Increase in local temperature.
- 2) Redness or rubor of the skin over the inflamed area due hyperaemia.
- 3) Pain or dolor

- 4) Swelling or tumor :It consist of pus
- 5) Loss of function.
- 6) Fluctuation at the site

Treatment^[41]

There are two lines of treatment

Conservative

Conservative In Inflammatory stage, various antibiotics are prescribed to suppress the inflammation.

Give rest to affected part.

Operative

But once suppuration occurs the rule is that 'when there is pus, let it out'

Pre-operative Procedure

- 1.Examination of the patient and Examianation of the site of abscess.
- 2.Necessary routine investigation (Hb%, RBS, HIV, Anti HCV, HBsAG)
- 3.Psychological Counselling of the patient.
- 4.Informed Consent.
- 5.Preparation of OT .
- 6.Sterilization.
7. Part-preparation.

Operative Procedure

1. Positioning of the patient
2. Painting with antiseptic solution and draping.
3. Anaesthesia This is usually done by local anaesthesia lignocaine with adrenaline.

In case of deep-seated abscess general anaesthesia is required.

4. Incision

- a)Free or liberal incision :Incision on most dependent and prominent part of the abscess to reduce surrounding tissue damage and to have free drainage.
- b) Hiltons' method:. Incision on most prominent and most dependent part of the abscess. Than abscess cavity is opened with a sinus forcep and loculies are broken with the finger. It is chosen when there are plenty of important structures like nerves and vessels around the abscess cavity, which are liable to injury.

c) Counter Incision : If one incision is not adequate to drain the abscess cavity or if the most prominent part is not the most dependent part then , complete drainage of pus is not possible with a single incision. So a counter incision is required at the most dependent part to facilitate drainage by gravity.

5. Drainage of Pus

6. Exploration:

After incision and removal of pus, a finger is inserted into the abscess cavity to break all walls and loculi

Post Operative Procedure

-Proper Cleaning and Dressing with antiseptic solution and ointment should be done.

-Proper mechanical debridement should be done to remove all the unhealthy tissue.

-Proper Dressing.

-Follow Up

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