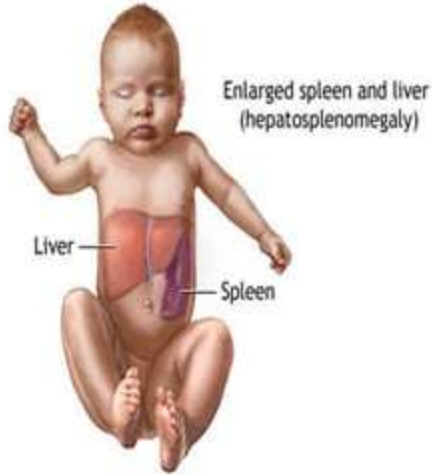
Hepatomegaly And Splenomegaly



Index:

Anatomy-

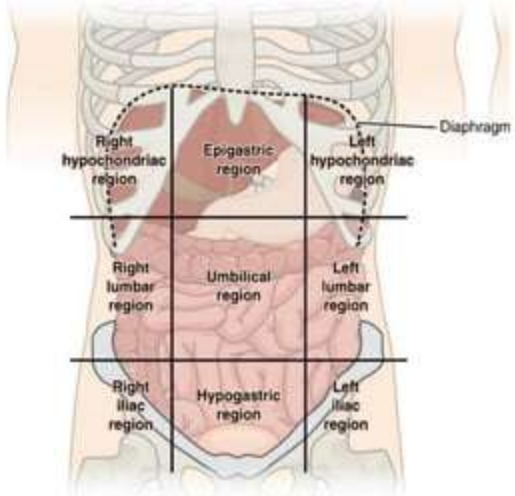
Liver

.Shaped like a cone, located in the right upper quadrant of the abdomen under the Rt lower rib cage against the diaphragm and variable extent into the Lt upper quadrant.

.The normal liver extends from the 5th ICS in the Rt MCL down to the costal margin.

Spleen

.The spleen is a wedge-shaped(tetrahedral) organ mainly lies in the hypochondrium, posterior end extends into epigastrium, placed between left dome of diaphragm and fundus of stomach and related to left 10th -12th ribs.



(a) Abdominopelvic regions

Function of Liver

- Metabolism of Carbohydrates, fats, proteins.
- Synthesis of bile and prothrombin.
- Excretion of drugs, toxins, poisons, bile pigment & heavy metals.
- Protective by conjugation, destruction, phagocytosis, antibody formation and excretion.
- Storage of glycogen, iron, fat, vitamin A and D.

Function of spleen

- Removes old RBC from circulation
- Reserve of blood
- Storage of RBC, platelets, and lymphocytes
- Metabolizes hemoglobin
- Recycles iron
- Active immune response to antigens

Etymology of Hepatomegaly

-It is formed by combining two Greek words: the first part comes from 'hepar' meaning 'liver' , and the second part from 'megas' meaning 'large'. The ending 'megaly' occurs in other english words that indicates excessive growth, such as hepatomegaly which refers to an enlarged liver.

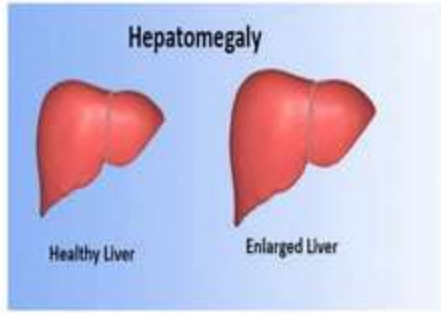
Etymology of Splenomegaly

-The word origin in early 20th century: From english(splen-spleen) and Greak(megas-megalo-large).

HEPATOMEGALY

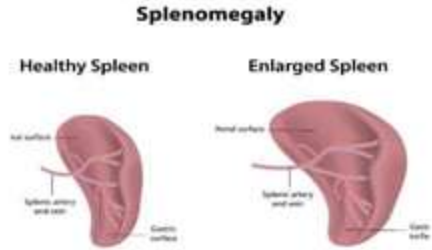
.Enlargement of liver is called hepatomegaly.

.Presence of a palpable liver does not always represent hepatomegaly.



SPLENOMEGALY

.The condition in which the spleen is massively enlarged, >8cm or crossing the umbilicus are underlined. Spleen diameters averaged over 13cm and an area above 45cms or weight above 400g are considered splenomegaly.



Ayurvedic Perspective

.According to ayurveda, hepatomegaly is known as Yakritodara. And splenomegaly is known as Plihodara.

.It is also a distinct type of Udara Roga.

.The diseases presenting with cardinal symptom of generalized enlargement of the abdomen is regarded as Udara Roga.

History of Hepatomegaly

- Acholic stools and jaundice in a newborn are concerning for neonatal cholestasis, including biliary atresia.
- Pruritus maybe a manifestation of cholestasis in older children.
- Fever, malaise, anorexia, sore throat, and rash are common findings in infectious mononucleosis.
- Jaundice, fever, abdominal pain, anorexia, malaise, and vomiting can be features of both acute and chronic hepatitis.
- Poor weight gain, loss of neurodevelopmental milestones, seizures disorders suggest metabolic disease.
- Past medical history should include exposure to blood products, immunization history, and resent respiratory and GI illness.
- Prenatal history should focus on maternal infections, placement of an umbilical catheter, and Rh or TORCH infection.
- Family history should focus on early infant death, autoimmune disorders hepatic and neurodegenerative disease.
- Medication history should include all prescribed medications.
- Other chronic illness: heart disease, severe anemia.

History of Splenomegaly

- Mild vague, abdominal pain.
- Pain maybe referred to the left shoulder.
- Early satiety from gastric displacement occurs with massive splenomegaly.
- Associated symptoms or signs.
- Febrile illness(infectious).
- Pallor, dyspnea, bruising, or petechiae(hemolytic process).
- History of liver disease(congestive).
- Weight loss, constitutional symptoms(neoplastic).
- Pancreatitis(splenic vein thrombosis).
- Hepatitis(cirrhosis).

Classification

Splenomegaly can be classify as;

-Mild
-Moderate
-Massive

Mild splenomegaly:

-Just palpable.
-(1-3)cm more than normal spleen(14cm-16cm).
-spleen>400g <1000g.

Moderate splenomegaly:

-Between costal margin and umbilicus.
-(4-8)cm more than normal spleen(17cm-21cm).
-spleen >400g <1000g.
-Splenic area 45cms-65cms.

Massive splenomegaly:

-Beyond umbilicus, crosses mid line into pelvis.
-Spleen>8cm than normal.
-Spleen>1000g.
-Splenic area >65cms.

The normal range for liver span:

In normal children, the liver is palpable 1cm and in infants up to 2cm below the costal margin. It is important to measure the liver span to determine the presence of hepatomegaly. The liver span varies with age:

	Mean Estimated Liver span(cm)			Mean Estimated Liver span(cm)	
Age in Years	Males	Females	Age in Years	Males	Females
0.5(6mo)	2.4	2.8	8	5.6	5.1
1	2.8	3.1	10	6.1	5.4
2	3.5	3.6	12	6.5	5.6
3	4.0	4.0	14	6.8	5.8
4	4.4	4.3	16	7.1	6.0
5	4.8	4.5	18	7.4	6.1
6	5.1	4.8	20	7.7	6.3

*Expected liver span of infants, children, and adolescents by percussion.

Grades of Hepatomegaly

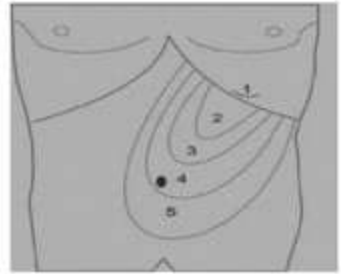
.Mild-<4cms below Rt. Subcostal Margin.

.Mod- 5-7cms below Rt. Subcostal Margin.

.Mass->7cms below Rt. Subcostal Margin.

Grades of Splenomegaly

Grade 0: Normal impalpable spleen.
Grade 1: Spleen palpable only on deep inspiration.
Grade 2: Spleen palpable on mid clavicular line, half way between umbilicus and costal margin.
Grade 3 : The spleen expands towards the umbilicus.
Grade 4 : The spleen goes past the umbilicus.
Grade 5 : The spleen expands towards the symphysis pubis.



Pediatric Splenomegaly

Splenic Length	Age Group
>6.0cm	3 months
>6.5cm	6 months
>7.0cm	12 months
>8.0cm	2 years
>9.0cm	4 years
>9.5cm	6 years
>10.0cm	8 years
>11.0cm	10 years
>11.5cm	12 years
>12.0cm	15 years

Mechanism of Hepatomegaly:

1.Increase the number or size of the cells intrinsic to the liver storage e.g.-Fat, malnutrition, obesity.

2.Inflammation: hepatitis.

3.Infiltration of cells- cystic masses secondary or metastatic process.

4.Increased size of vascular space-intrahepatic obstruction to hepatic vein outflow, hepatic vein thrombosis, CCF.

5.Increased size of biliary space: congenital hepatic fibrosis.

6.diopathic.

Mechanism of Splenomegaly

1.Reactive reticulo-endothelial hyperplasia.

2.Lymphoid hyperplasia.

3.Proliferation of lymphoma cells.

4.Infiltration by abnormal cells.

5.Extramedullary hemopoeisis.

6.Proliferation of macrophages d/t RBC destruction.

7.Vascular congetion.

Causes of Hepatomegaly

Infective:	Viral hepatitis, liver abscess (pyogenic or amebic), tuberculosis, salmonella, malaria, kala-azar, hydatid disease.
Chronic liver disease (cirrhosis or chronic hepatitis):	Wilson disease, chronic hepatitis B and C, autoimmune liver disease, Budd-Chiari syndrome, cryptogenic.
Metabolic or storage disorders:	Glycogen storage disease, Gaucher disease, Niemann-Pick disease, progressive familial intrahepatic cholestasis, nonalcoholic fatty liver disease.
Tumors:	Lymphoma, leukemia, histiocytosis, neuroblastoma, benign hemangioendothelioma, mesenchymal, hamartoma, hepatoblastoma, hepatocellular carcinoma.
Biliary:	Caroli disease, choledochal cyst, congenital hepatic fibrosis, cystic disease of liver, extrahepatic biliary obstruction.
Miscellaneous:	Congestive heart failure, constrictive pericarditis, sarcoidosis.

Common causes of Splenomegaly

Portal hypertension:	**Cirrhosis, Extrahepatic Portal Venous Obstruction, congenital hepatic fibrosis, Noncirrhotic Portal Fibrosis, Budd-Chiari syndrome.**
Storage disorders:	Niemann-Pick disease, **Gaucher Disease,** mucopolysaccharidosis.
Hematological malignancies:	Acute leukemia, **chronic Myeloid Leukemia, Myeloproliferative Disorders,** lymphoma, histiocytosis.
Increased splenic function:	Collagen vascular disorders, autoimmune hemolytic anemia, inherited hemolytic anemias, (thalassemia major, hereditary spherocytosis)
Infections:	**Malaria,** enteric fever, viral hepatitis, infectious mononucleosis, kala-azar, congenital infections.
Extramedullary hematopoiesis:	**Osteopetrosis**

*Condition that may cause splenomegaly are in bold and underlined.

Clinical Features of Hepatomegaly

.Abdominal pain

.Dull pain in the upper right half of the abdomen

.Loss of appetite

.Fatigue

.Muscle aches

.Jaundice

.Yellowish conjunctiva of the eyes

.Urine is dark yellow with pale stool

.Presence of bleeding under the skin and bleeding gums.

Clinical Features of Splenomegaly

.Failure to thrive, weight loss, malaise, lethargy, night sweats

.Feeding difficulties.

.Developmental or neurologic abnormalities

.Infections

.Abnormal stooling patterns, early satiety, nausea, vomiting, abdominal pain or other GIT changes

.Musculoskeletal abnormalities, including pain, limited range of motion, arthritis, arthralgia, or abnormal bone development

.Pruritus, pallor, icterus, exanthem, or enanthem

.Abnormal vital signs

.Ophthalmologic abnormalities(uveitis, iritis, vascular occlusion, opacification)

.Abnormal heart sound
.Dyspnea, abnormal breath sounds
.Hepatomegaly, abnormal masses or tenderness

Etiology and Pathogenesis of Plihodara :

अशितस्यातिसंक्षोभाद्यानयानातिचेष्टितैः
अतिव्यवायभाराध्ववमनव्याधिकर्शनैः ॥ ३५ ॥

वामपार्श्वश्रितः प्लीहा च्युतः स्थानात् प्रवर्धते ।
शोणितं वा रसादिभ्यो विवृद्धं तं विवर्धयेत् ॥ ३६ ॥

तस्य प्लीहा कठिनोऽष्ठीलेवादौ वर्धमानः कच्छपसंस्थान उपलभ्यते; स
बोपेक्षितः क्रमेण कुक्षिजठरमग्न्यधिष्ठानं च परिक्षिपन्नुदरमभिनिर्वर्तयति ॥ ३७ ॥

-Spleen which is located in the left side [of the abdomen] gets displaced and enlarged because of the intake of excessively irritating food, travelling in excess, riding a vehicle, strenuous exercise, over indulgence in sex, lifting heavy weight, walking a long distance and emaciation caused by excessive administration of emetic therapy or by suffering from a [chronic] diseases.

-Spleen also gets enlarged because of increase in the quantity of blood as a result of increase in the quantity of rasa (chyle) etc.

-The spleen becomes stony-hard in the beginning of the process of enlargement and [on palpation] feels like a tortoise. If the treatment of this condition is neglected, it gradually puts pressure and expands over the kuksi (side of the abdomen), remaining part of the abdomen and agnyadhisthāna (pancreas) as a result of which plihodara is manifested.

Signs and Symptoms of Plihodara and Yakrddalyudara:

तस्य रूपाणि - दौर्बल्यारोचकाविपाकवर्चीमूत्रग्रहतमःप्रवेशपिपासाङ्ग-
मर्दच्छर्दिमूर्च्छाङ्गसादकासश्वासमृदुज्वराना।हाग्निनाशकार्यास्यवैरस्यपर्वभेदकोष्ठ-
वातशूलानि, अपि चोदरमरुणवर्णं विवर्णं वा नीलहरितहारिद्रराजिमद्भवति;
एवमेव यकृदपि दक्षिणपार्श्वस्थं कुर्यात्, तुल्यहेतुलिङ्गौपधत्वात्तस्य प्लीहजठर
एवावरोध इति; प्लीहोदरमिति विद्यात् ॥ ३८ ॥

The following are the signs and symptoms of plihodara (splenic enlargement):

i) Weakness, anorexia, indigestion, retention of stool and urine, entering into darkness, excessive thirst, malaise, vomiting, fainting, prostration, cough, dyspnoea, mild fever, ānāha (immobility of wind in the abdomen), loss of the power of digestion, emaciation, distaste in the mouth, pain in finger joints, distension of alimentary tract by wind and colic pain.

ii) reddishness or discolouration of the abdomen and

iii) appearance of net-work of veins having blue, green or yellow colour.

Similar signs and symptoms are manifested by the enlargement of liver (yakrddalyudara) which is located in the right side of the abdomen.

Investigation of Hepatosplenomegaly

-CBC
-Differential Reticulocyte count
-Peripheral smear study
-Blood C/S
-Serology(viral,parasitic)
-LFT
  .Serum aspartate aminotransferase(SGOT)
  .Alkaline aminotransferase(SGPT)
  .Alkaline phosphatase
  .Total protein
  .Albumin
  .Bilirubin
-Hb electrophoresis
-Coagulation profile
-Amylase/lipase
-Anti CCP,RA factor
-Bone marrow analysis

Differential Diagnosis of Hepatosplenomegaly

-Enlarged left lobe liver
-Enlarged left kidney
-TB
-Leukemias
-Lymphomas
-Chronic malaria
-Carcinoma stomach
-Carcinoma splenic flexure colon
-Omental mass
-Malignancy tail of pancreas
-Neimann pick(Hurler's/Gaucher's)
-Leishmaniasis(malaria/filariasis)

Diagnosis of Hepatosplenomegaly

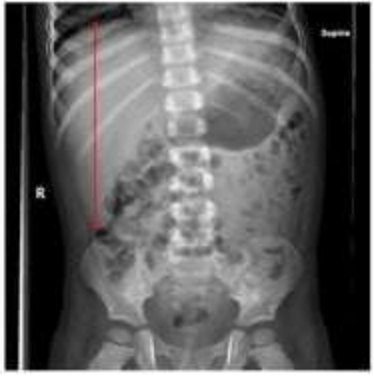
.Physical Examination
-to assess the size and tenderness of the liver and spleen.

.Blood Test
-to check liver and spleen function, as well as for signs of infection or Inflammation.

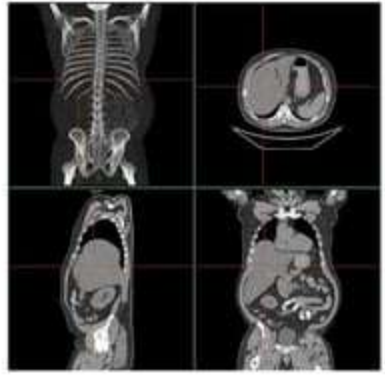
.Imaging Examination
-such as Ultrasonography, CT scan, MRI, Computed Tomography, Liver-spleen colloid scan, to visualize the liver and spleen and identify any abnormalities or structural changes.

.Biopsy
-such as liver biopsy, if necessary to obtain a tissue sample for further analysis and to determine the cause.

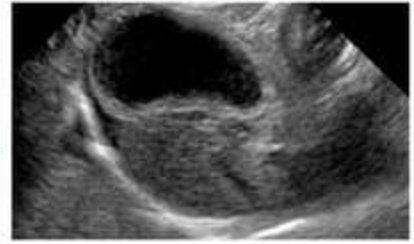
Diagnosis of Hepatomegaly



Abdominal radiography of hepatomegaly

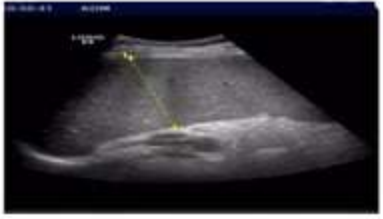


Computerized tomography of affected person with hepatomegaly

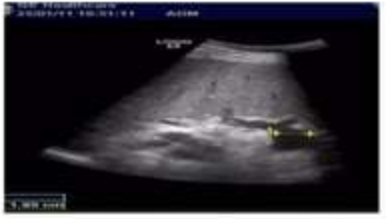


Ultrasound

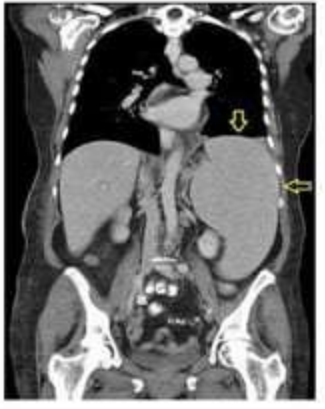
Diagnosis of splenomegaly



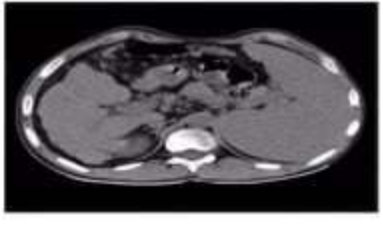
Massive splenomegaly
Mild irregular contour inhomogeneous echo-structure with diffuse hyperechoic foci suggesting small infections



Splenomegaly with Splenic vein Dilation



Abdominal radiography



Computed tomography

Management of Hepatosplenomegaly

-Dietary advice: Uncooked corn starch meal

.< 2 years: 1.6 gm/kg body weight every 4 hrs
.> 2 years: 1.75-2.5 gm/kg body weight every 6 hrs

-Calcium and Vitamin D supplementation

-Allopurinol for hyperuricemia

-Role of ACE inhibitors

-Statins or Fibrate for hyperlipidemia

-Orthotopic liver transplantation

-Genetic counselling:
.Carrier detection and prenatal diagnosis possible with DNA based diagnosis

Ayurvedic treatment for Yakrutodara and Plihodara:

चिकित्सां सम्प्रकुर्वीत यथादोषं यथाबलम्॥
स्नेहं स्वेदं विरेकं च निरूहमनुवासनम् ।
समीक्ष्य कारयेद्वाही वामे वा व्यधयेत् सिराम्॥
पट्पलं पाययेत् सर्पिः पिप्पलीर्वी प्रयोजयेत।
सगुडामभयां वाऽपि क्षारारिष्टगणांस्तथा।।
एष क्रियाक्रमः प्रोक्तो योगान् संशमनाञ्छृणु। **-C.S.Ch.13.74-79.**

Treatment principle for yakrutodara and plihodara is commom; the treatment is as follows: Treatment as per the doshic vitiation in nature, sneha karma, svedana karma, virechana, niruha and anuvasana vasti etc are done in stipulated order.
Raktamokshanam is performed by sirovydhanam at left arem.
In plihodara raktamokshanam is done at right arm.
The patient is given the following recipes:
1.Satphalaghrita
2.Pippalirasayan
3.Abhaya mixed with jaggery and
4.Recipes of ksara and aristas are given internally as per the dosha involvement of patient.

Few compound preparations to be prescribed for udara roga like, vidangarista, rohitakadi yogam, yogarajam, narasimhachurna, pippali vardamana yogam and cyavanaprasa etc are useful in yakrutodara and plihodara.
Follow up can be as explained for udararoga is adviseable for plihodara also. Use of mutrakrichra hara treatment will control the further enlargement of spleen is observed. In a broad view adbuda, galaganda cikitsa also can be adapted in the part of treatment.

Treatment of Prihodara and Yakrddalyudara according to charak samhita :

उदावर्तरुजानाहैर्दाहमोहतृषाज्वरैः
गौरवारुचिकाठिन्यैश्चानिलादीन् यथाक्रमम् ॥ ७५ ॥

लिङ्गैः प्लीहन्ह्युधिकान् दृष्ट्वा रक्तं चापि स्वलक्षणैः।
चिकित्सां संप्रकुर्वीत यथादोषं यथाबलम् ॥ ७६ ॥

स्नेहं स्वेदं विरेकं च निरूहमनुवासनम्।
समीक्ष्य कारयेद्वाहौ वामे वा व्यधयेत् सिराम् ॥ ७७ ॥

षट्पलं पाययेत् सर्पिः पिप्पलीर्वा प्रयोजयेत्।
सगुडामभयां वाऽपि क्षारारिष्टगणांस्तथा ॥ ७८ ॥

एष क्रियाक्रमः प्रोक्तो योगान् संशमनाञ्छृणु।
पिप्पली नागरं दन्ती चित्रकं द्विगुणाभयम् ॥ ७९ ॥

विडङ्गांशयुतं चूर्णमेतदुष्णाम्बुना पिबेत्।
विडङ्गं चित्रकं शुण्ठीं सघृतां सैन्धवं वचाम् ॥ ८० ॥

दग्ध्वा कपाले पयसा गुल्मप्लीहापहं पिबेत्।
रोहीतकलतानां तु काण्डकानभयाजले ॥८१॥

मूत्रे वा सुतुयात्तच्च सप्तरात्रस्थितं पिबेत्।
कामलागुल्ममेहार्शःप्लीहसर्वोदरक्रिमीन् ॥८२॥

स हन्याज्जाङ्गलरसैर्जीर्णे स्याच्चात्र भोजनम्।
रोहीतकत्वचः कृत्वा पलानां पञ्चविंशतिम् ॥ ८३ ॥

कोलद्विप्रस्थसंयुक्तं कषायमुपकल्पयेत् ।
पलिकैः पञ्चकोलैस्तु तैः सर्वैश्चापि तुल्यया ॥ ८४ ॥

रोहीतकत्वचा पिष्टैर्घृतप्रस्थं विपाचयेत्।
प्लीहाभिवृद्धिं शमयत्येतदाशु प्रयोजितम् ॥ ८५ ॥

तथा गुल्मोदरश्वासक्रिमिपाण्डुत्वकामलाः ।
अग्निकर्म च कुर्वीत भिषग्वातकफोल्बणे ॥ ८६ ॥

पैत्तिके जीवनीयानि सर्पिः क्षीरबस्तयः ।
रक्तावसेक संशुद्धिः क्षीरपानं च शस्यते ॥ ८७॥

यूषैर्मांसरसैश्चापि दीपनीयसमायुतैः ।
यकृति प्लीहवत् सर्वं तुल्यत्वाद्धेपजं मतम् ॥ ८८ ॥

लघून्यन्नानि संसृज्य दद्यात् प्लीहोदरे भिषक् ।

Plihodara is associated with udavarta (upward movement of wind in the abdomen), pain and anâha (abdominal distension) because of the predominance of vayu; with burning sensation, unconsciousness thirst and fever because of the predominance of pitta, and with heaviness, anorexia as well as hardness because of the predominance of kapha. Similarly, the predominance of vitiated blood can be ascertained by its signs and symptoms (described in Sutra 24/11 - 16) . Having ascertained the exact variety of plihodara, appropriate treatment should be provided depending upon the dosas involved in the manifestation of the disease and the strength of the patient.

The patient should be given oleation, fomentation, purgation, nirüha (a type of medicated enema prepared of decoction, etc.) and anuvāsana (another type of medicated enema prepared of oil, etc.) therapies as are appropriate to his ailment. Venesection should also be performed in his left arm. The patient should be given the following recipes :

i) Satpala ghita (vide Cikitsā 5/147 - 148)
ii) preparation of pippali (already described in Cikitsa 1 :3: 32-40);
iii) abhayā mixed with jaggery, and
iv) recipes of kṣāras (alkali preparations) and aristas (alcoholic preparations) which are to be described latter in verses 80-82 below and in chapters 14 and 15 of Cikitsa sthāna.

The above mentioned line of treatment should be appropriately adopted.

The following are the recipes constituting alleviation therapy for this ailment:

1. Powder of pippali (one part), nāgura (one part), danti(one part), citraka (one part), abhayā (two parts) and vidangu (one part) should be given to the patient with hot water.

2. Vidariga, citraka, sunthi, ghee, rock-salt and vaca all these drugs taken in equal quantities should be kept over an earthen plates. [It should be covered with another earthen plate and the joints should be sealed.) This should be placed over fire to reduce the ingredients into ashes. Intake of this along with milk cures gulma (phantom tumour) and plihodara (splenic enlargement).

3. Stems of rahitaka should be cut into small pieces. To this, the crushed pulp of haritaki should be added. These ingredients should be soaked in adequate quantity of either water or cow's urine and allowed to ferment for seven nights. Intake of this liquid cures kamala (jaundice), gulma (phantom tumour), meha (obstinate urinary diseases including diabetes), piles, plihodara (splenic enlargement), all the remaining types of udara rogas (obstinate abdominal disorders) and kymi roga (parasitic infestation). After this potion is digested, the patient should be given the soup of the meat of animals inhabiting arid zone and

4. The bark of rohitaka (twenty five palas) and kola (two prasthas) should be boiled with [eight times of] water [and reduced to one fourth). To this, the paste of pippali müla (one pala), cavya (one pala), citraka (one pala), nagara (one pala) and the bark of rohitaka (five palas) and ghee (one prastha) should be added and cooked. This medicated ghee instantaneously cures splenic 'enlargement, gulma (phantom tumour), udara (obstinate abdominal disorder), asthma, krimi (parasitic infestation), anemia and jaundice.

If there is predominance of aggravated vayu and kapha in the patient suffering from splenic enlargement then agni karma (cauterisation therapy) should be administered. If pitta is aggrevated then Jivaniya ghrita (medicated ghee prepared by boiling with drugs belonging to jivaniya group), ksira basti (enema with milk), blood-letting, elimination therapies, light purgation therapy and intake of milk are useful.

Such a patient should be given food mixed with vegetable soup and meat soup prepared by boiling with digestive stimulants.

In Yakydudara (enlargement of liver), all the therapies prescribed for plihadara (enlargement of spleen) should be aministered because of the similarity between these two conditions.

After the administration of therapies, the patient suffering from plihadara (splenic enlargement) should be given samsarjana krama (administration of lighter to heavier food gradually) with the help of food ingredients which are easily digestable. [75 - 1/2 * 89]

Prognosis of Hepatosplenomegaly

-Guarded

-Early diagnosis and effective treatment have improved the outcome.

-Renal disease and formation of hepatic adenomas with potential risk for malignant transformation remain serious complications.

Case Studies

Patient ID	Age	Gender	Diagnosis	Treatment
Case 1	6 years	Male	Hepatomegaly due to viral infection	Antiviral medication, rest, and hydration
Case 2	8 years	Female	Splenomegaly caused by autoimmune disease	Immunosuppressive therapy and regular monitoring
Case 3	4 years	Male	Hepatomegaly and splenomegaly due to genetic disorder	Supportive care, genetic counselling, and regular follow-up
Case 4	10 years	Female	Hepatomegaly and splenomegaly secondary to liver disease	Liver transplant evaluation and management of underlying condition
Case 5	7 years	Male	Splenomegaly caused by hematological disorders	Blood transfusions, medication, and close hematological monitoring

Reference:

-Ghai essential pediatrics (Vinod k Paul and Arvind Bagga)
-A text book of kaumarbhritya (Dr. P. Mallikarjuna Rao)
-Charak samhita (Chikitsa sthana)
-Online web site: wikipedia, SlideShare, National Institute of Health(.gov), Osmosis, The Journal of pediatrics.