

Examination Of the Spleen



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Introduction

- **NORMAL SPLEEN palpable or not?**
 - NOT palpable clinically
 - Only occasionally palpable in 1-3 % of New Guinea population (exception)
 - Tip may be palpable in newborn up to 3 months of age

- **Size of NORMAL SPLEEN?**
 - 5 inches (length) x 3 inches (width) x 1 inches (thickness) i.e. 12 x 7 cm
 - Enlarged if largest dimension > 14 cm (SRB's clinical methods in surgery, 1st edition, pg. 466)

ANATOMY OF SPLEEN

Location: Left hypochondrium

Rule of odds (1,3,5,7,9-11):

1 inch thick

3 inches broad

5 inches long

7 ounces weight

underlies 9-11 ribs

Position: obliquely along long axis of 10th rib; directed downward, forward and laterally

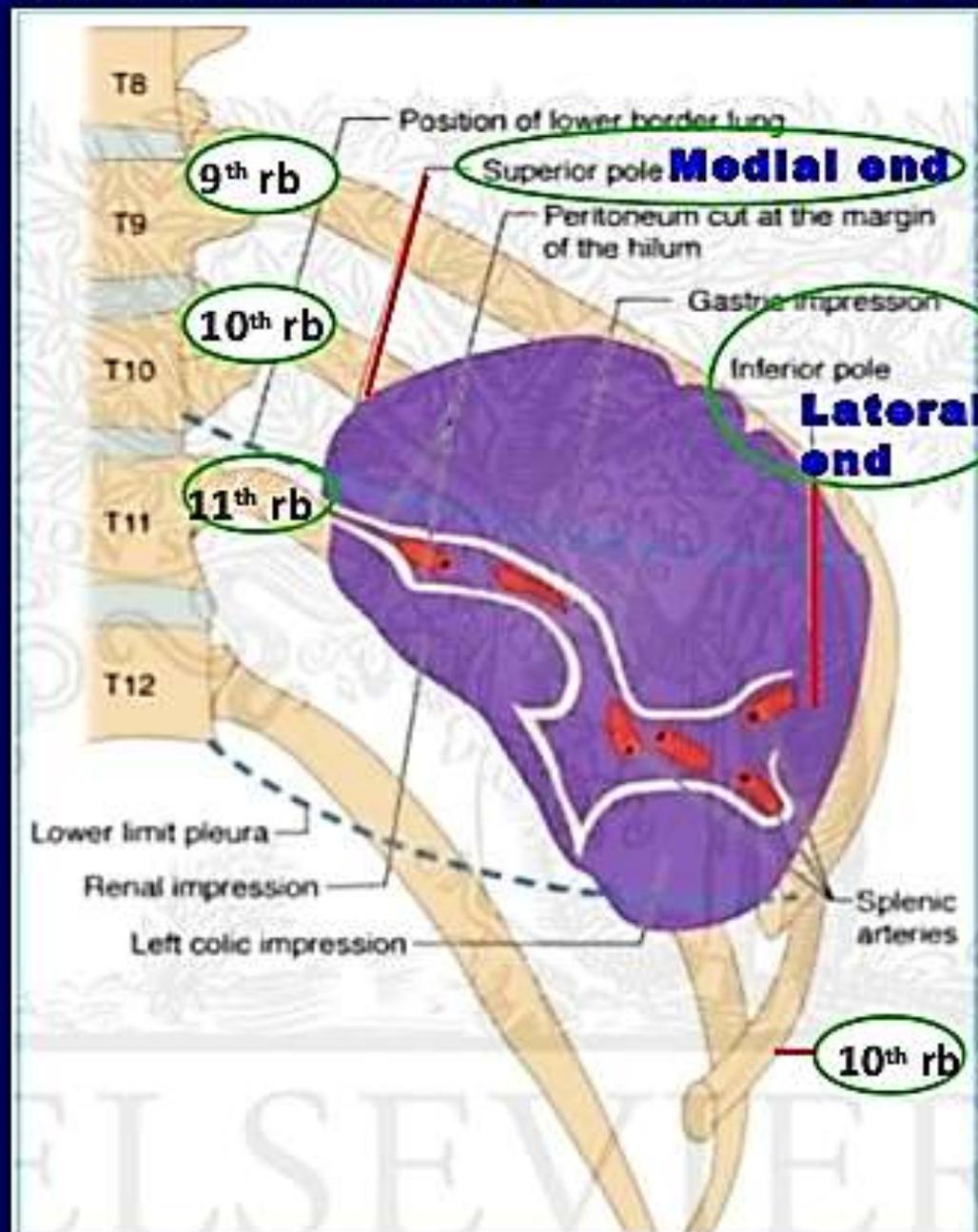
Arterial supply: Splenic artery from celiac trunk

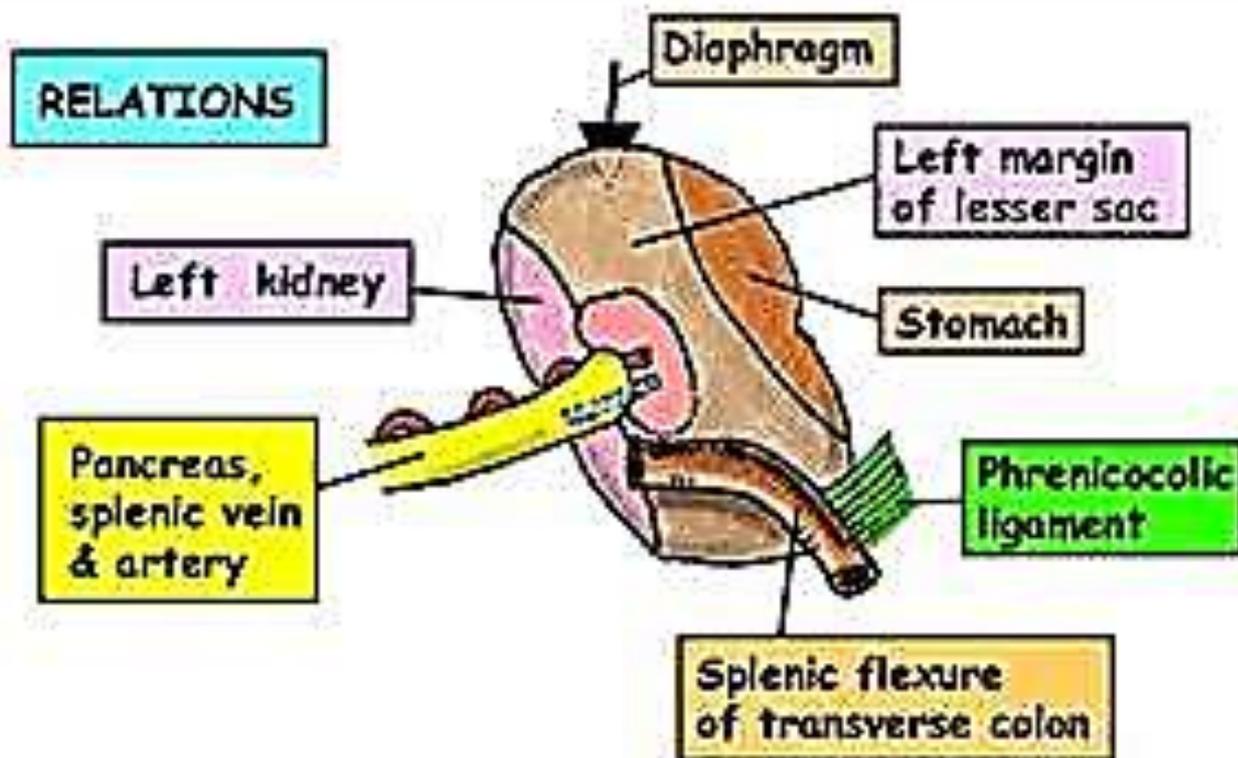
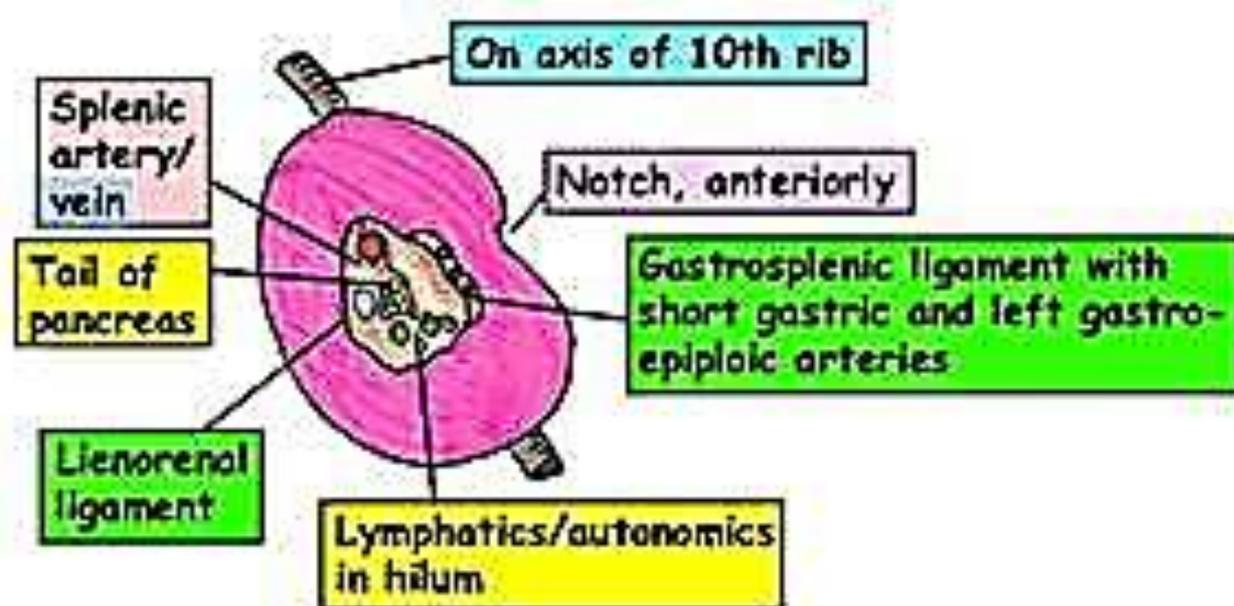
Venous drainage: Splenic vein → Portal vein

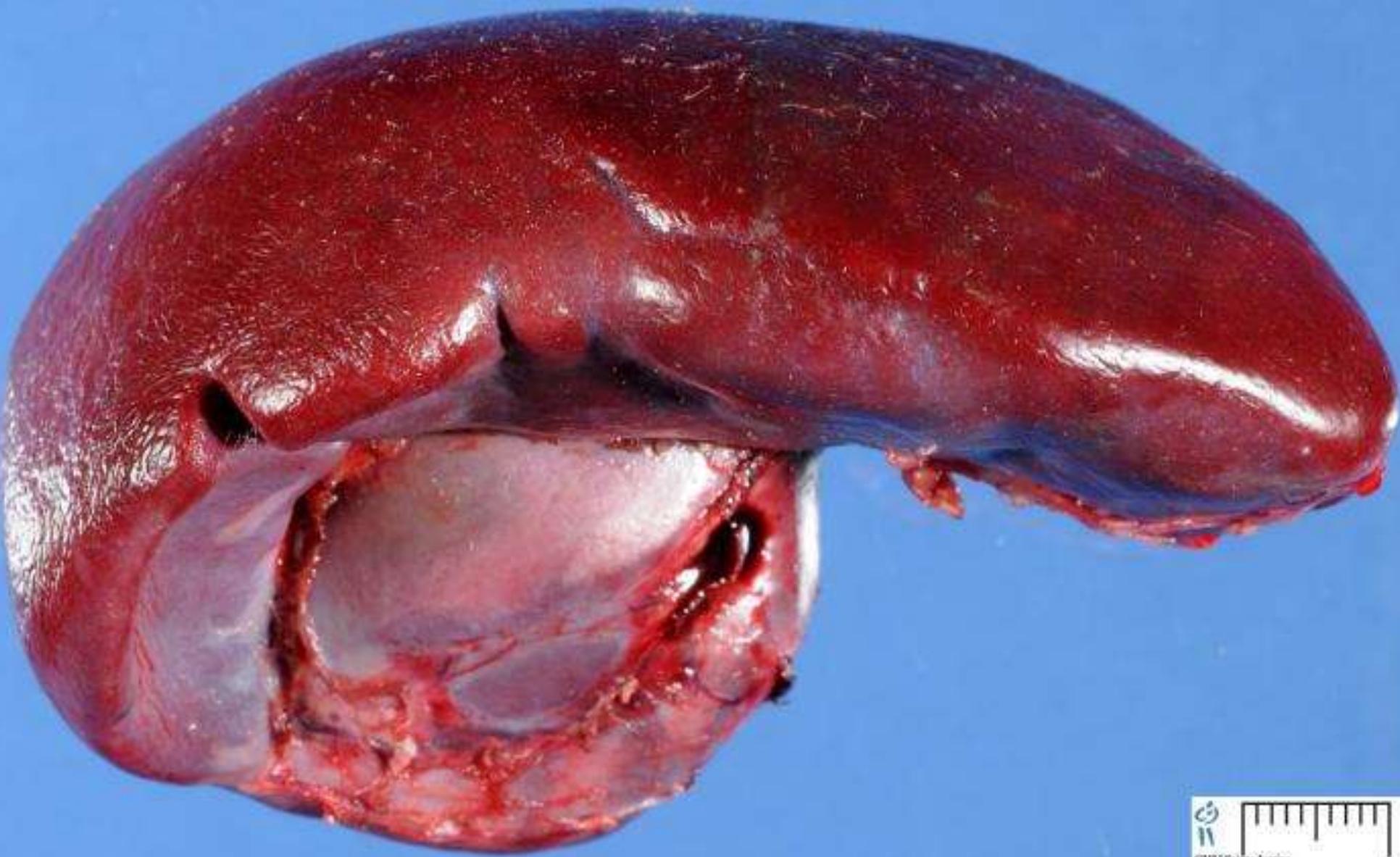
Lymphatic drainage: Celiac (Para-aortic) nodes

Nerve supply: Sympathetic from celiac plexus

Surface anatomy of the Spleen







Splenomegaly is a term which refers to enlargement of the spleen. The normal adult splenic length upper limit is usually around 12-15 cm. Also one should know how to calculate splenic index, volume and mass by CT and MR techniques. Massive splenomegaly is a term used when the spleen weighs >1000 g.

Pathology

The causes of splenomegaly are protean, and can be thought of under a number of headings:

1. Hematological disease
2. Haemodynamic
3. Infectious
4. Storage diseases/metabolic/infiltrative disorders
5. Neoplastic (Non-Haematological)
6. Traumatic
7. Connective tissue disorders

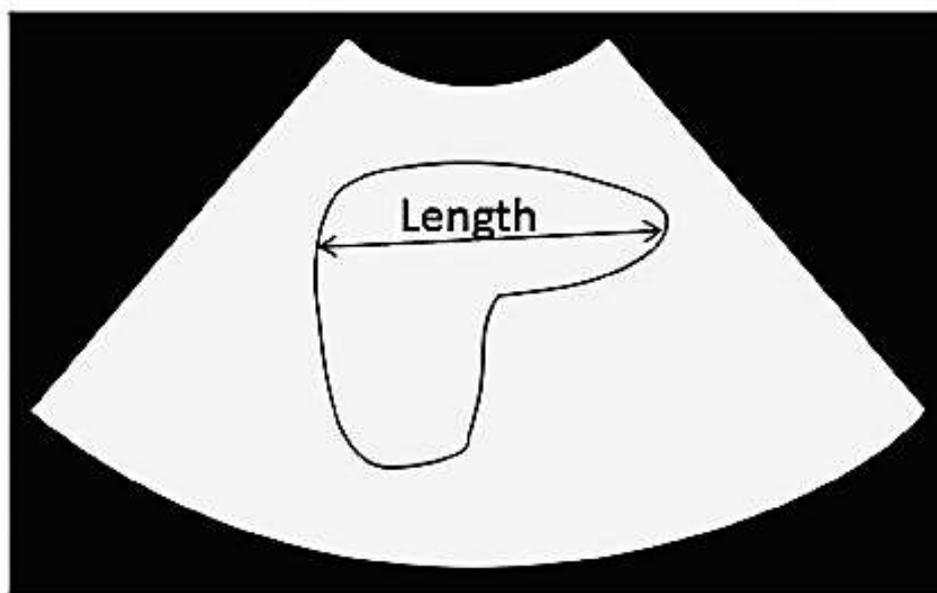
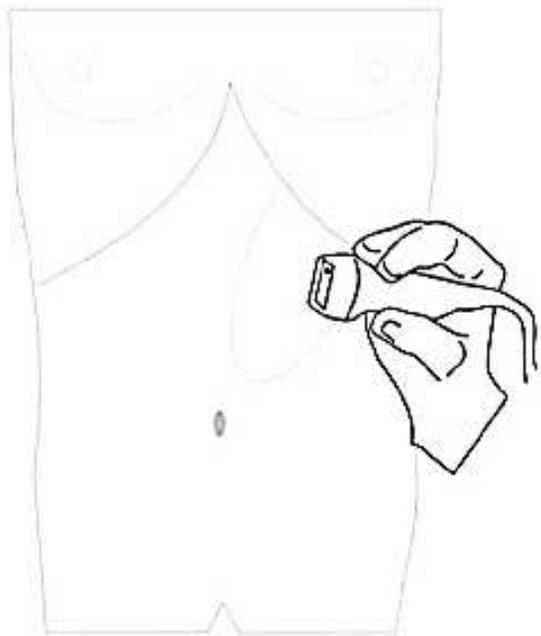
Splenomegaly - Causes

| Light | Moderate | Massive |
|--|---|--|
| <p>Chronic passive congestion</p> <p>Acute malaria</p> <p>Typhoid fever</p> <p>Subacute bacterial endocarditis</p> <p>Acute and sub-acute infection</p> <p>Systemic lupus erythematosus</p> <p>Thalassemia minor</p> | <p>Rickets</p> <p>Hepatitis</p> <p>Hepatic cirrhosis</p> <p>Lymphoma(leukemia)</p> <p>Infectious mononucleosis</p> <p>Pernicious anemia</p> <p>Abscesses, infarcts</p> <p>Amyloidosis</p> | <p>Chronic myelocytic leukemia</p> <p>Myelofibrosis</p> <p>Gaucher's disease</p> <p>Neimann-Pick disease</p> <p>Thalassemia major</p> <p>Chronic malaria</p> <p>Leishmaniasis</p> <p>Splenic vein thrombosis</p> <p>Leukemia</p> |

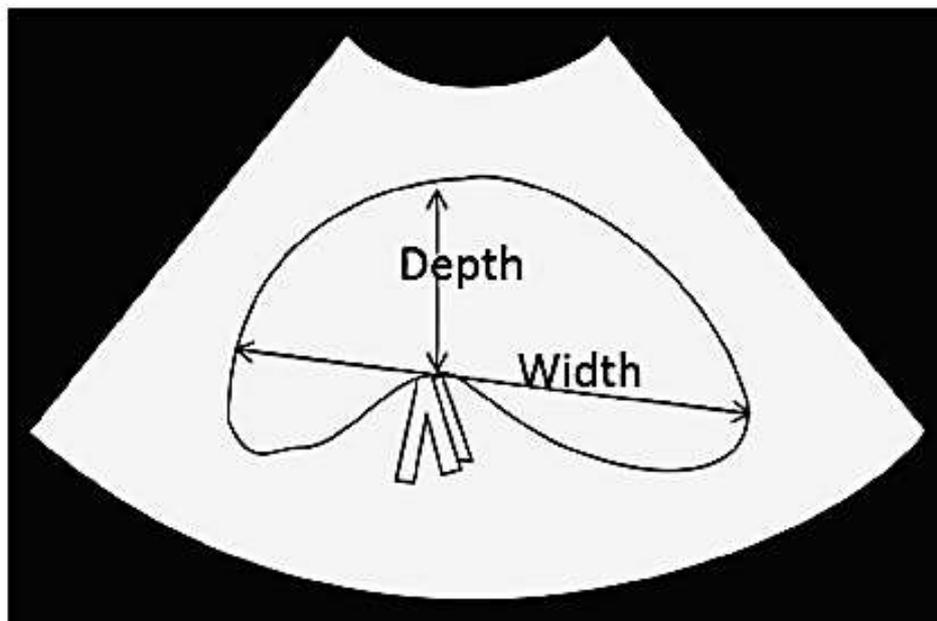
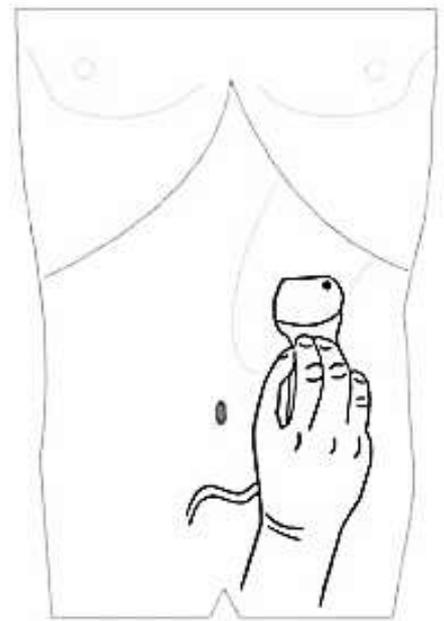
Radiographic features

- ❖ The shape and orientation of a spleen makes accurate linear measurement difficult.
- ❖ On CT, a splenic width measurement (largest anterior-posterior measurement on axial images) of greater than 10.5 cm is the most accurate single measurement for mild to moderate splenomegaly, while a cranial-caudal height measurement of greater than 14.6 cm is the most accurate single measurement for massive splenomegaly.
- ❖ On sonographic assessment, a length of 12 cm is generally considered the upper limit of normal.

Panel A



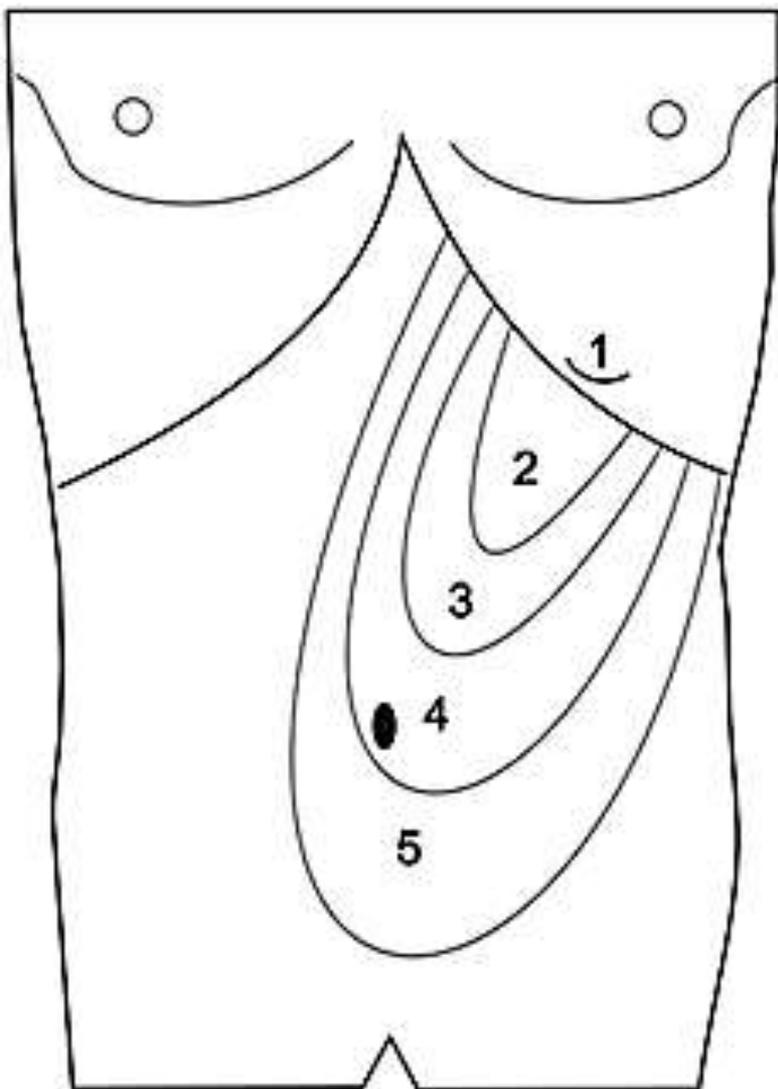
Panel B



Grades of Hackett for Splenomegaly Based on the Clinical Examination

Hackett graded splenomegaly in malaria based on clinical findings. This same grading scheme can be used for other disorders causing splenomegaly.

| Grade | Clinical Findings |
|--------------|--|
| 0 | Spleen non-palpable |
| 1 | Spleen only palpable when the patient takes a deep breath |
| 2 | Spleen less than halfway between costal margin and the level of the umbilicus |
| 3 | Spleen more than halfway between the costal margin and the level of the umbilicus |
| 4 | Spleen below the umbilicus but not more than halfway between the level of the umbilicus and the symphysis pubis |
| 5 | Spleen more than halfway between the level of the umbilicus and the level of the symphysis pubis |



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

Palpation



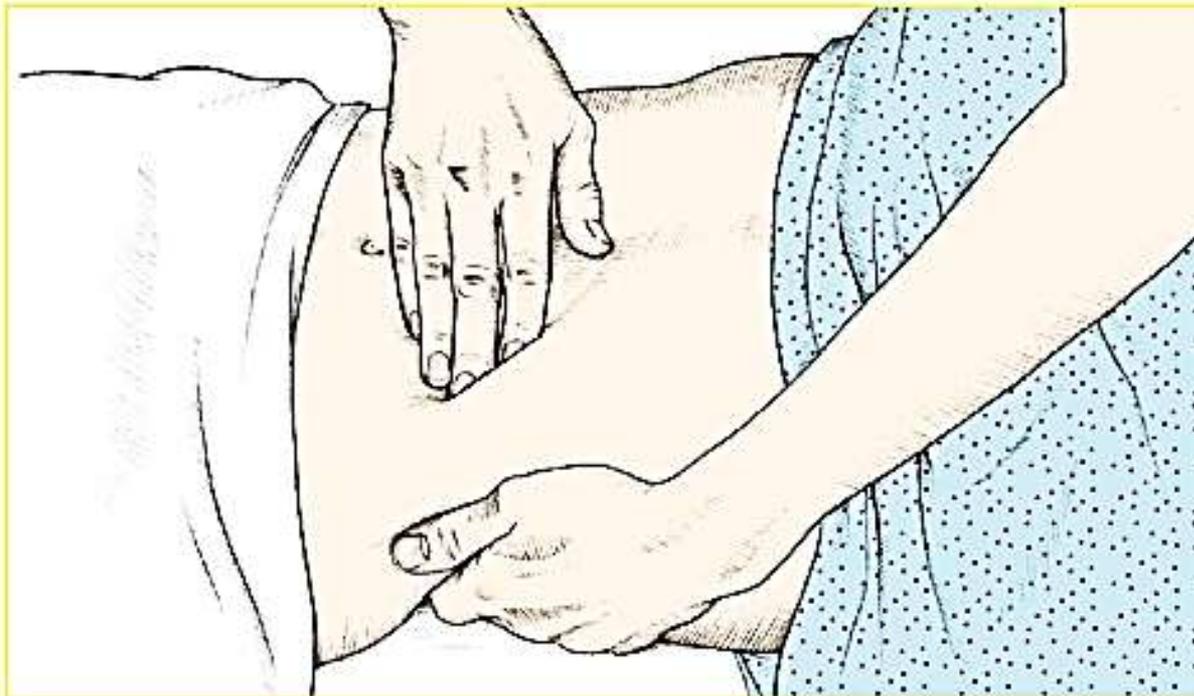
HOW TO PALPATE FOR SPLENOMEGALY

Detecting splenomegaly requires skillful and gentle palpation to avoid rupturing the enlarged spleen. Follow these steps carefully:

- ◆ Place the patient in the supine position, and stand at her right side. Place your left hand under the left costovertebral angle, and push lightly to move the spleen forward. Then press your right hand gently under the left front costal margin.
- ◆ Have the patient take a deep breath and then exhale. As she exhales, move your right hand along the tissue contours under the border of the ribs, feeling for the spleen's edge. The enlarged spleen should feel like a firm mass that bumps against your fingers. Re-

member to begin palpation low enough in the abdomen to catch the edge of a massive spleen.

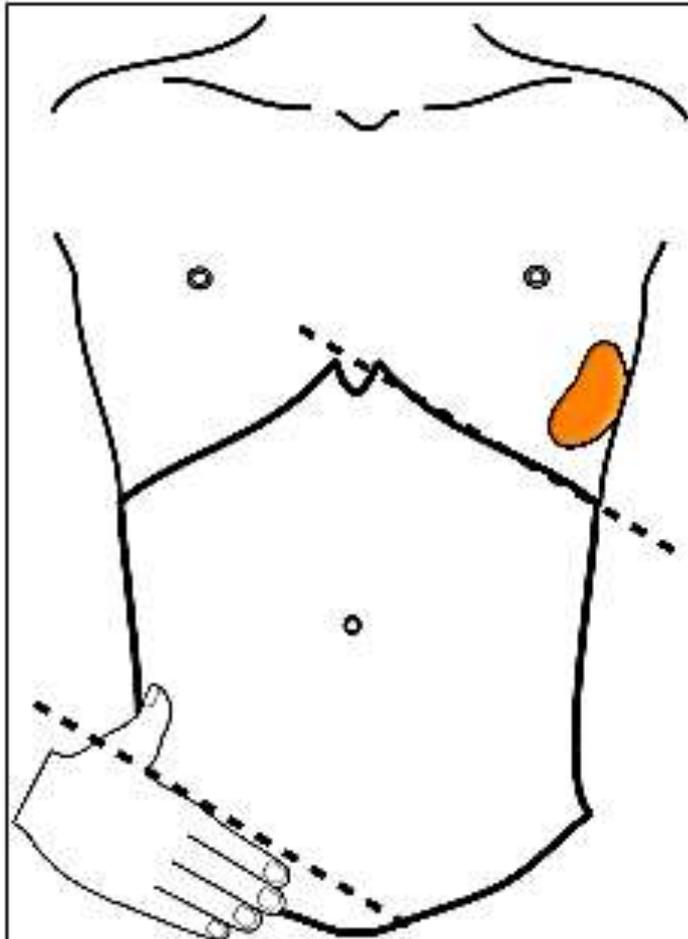
- ◆ Grade the splenomegaly as slight ($\frac{1}{2}$ " to $1\frac{1}{2}$ " [1 to 4 cm] below the costal margin), moderate ($1\frac{1}{2}$ " to 3" [4 to 8 cm] below the costal margin), or great (greater than or equal to 3" [8 cm] below the costal margin).
- ◆ Reposition the patient on her right side with her hips and knees flexed slightly to move the spleen forward. Then repeat the palpation procedure.



- Method #1
 - begin palpation in the RLQ
 - direct the patient's breathing by telling them when to take a deep breath and when to exhale
 - while proceeding diagonally towards the Left Upper Quadrant (LUQ), try to palpate the spleen edge during each inspiratory phase

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Palpation of the spleen 1



- In view of the direction of enlargement, palpation for the spleen should commence well away from the costal margin in the right iliac area
- The thumb is extended to expose the lateral margin of the index finger
- The hand is positioned so that the lateral margin of the index finger is parallel with the left costal margin



- Method #2

- place your Left hand under patient's Left posterior chest at pull upwards
- with your Right hand, begin palpation in the RLQ
- direct the patient's breathing by telling them when to take a deep breath and when to exhale
- while proceeding diagonally towards the LUQ, try to palpate the spleen edge during each inspiratory phase





**Palpating the spleen – Bimanual palpation in
Rt. Lateral position**

With the patient in the right lateral position, minimal splenic enlargement can be detected



Umbilicus

**Palpating the spleen – Bimanual palpation in Rt.
Lateral position**

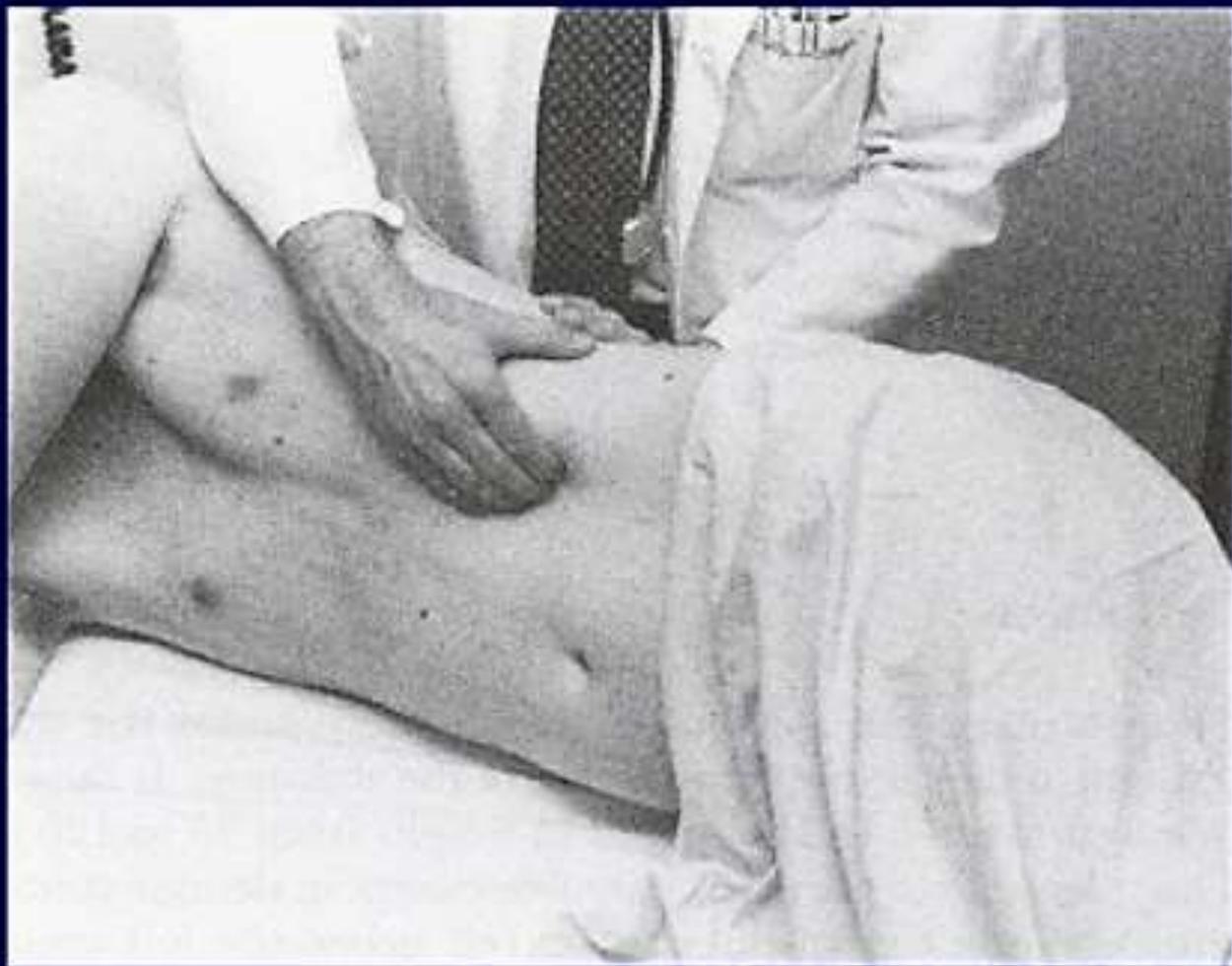
- Method #3

- place the patient's Left fist under their Left posterior chest
- with your Right hand, begin palpation in the RLQ
- direct the patient's breathing by telling them when to take a deep breath and when to exhale
- while proceeding diagonally towards the LUQ, try to palpate the spleen edge during each inspiratory phase

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- Method #4 –The Hooking maneuver of Middleton

- place the patient's Left fist under their Left posterior chest
- position yourself on the patient's Left side, facing the patient's feet
- using both hands, curl your fingers under the patient's Left costal margin
- ask the patient to take a long, deep breath → attempt to palpate the spleen with your fingertips



Hooking method

Examining for the spleen from behind the patient, in the right lateral position. In this case, the fingers are "hooked" over the costal margin.

Percussion

1. Percussion of Traube's Space.
2. Percussion by castell's Method.
3. Percussion by Nixon Method.

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Percussion by Castell's Method

Percussion of Traube's Space

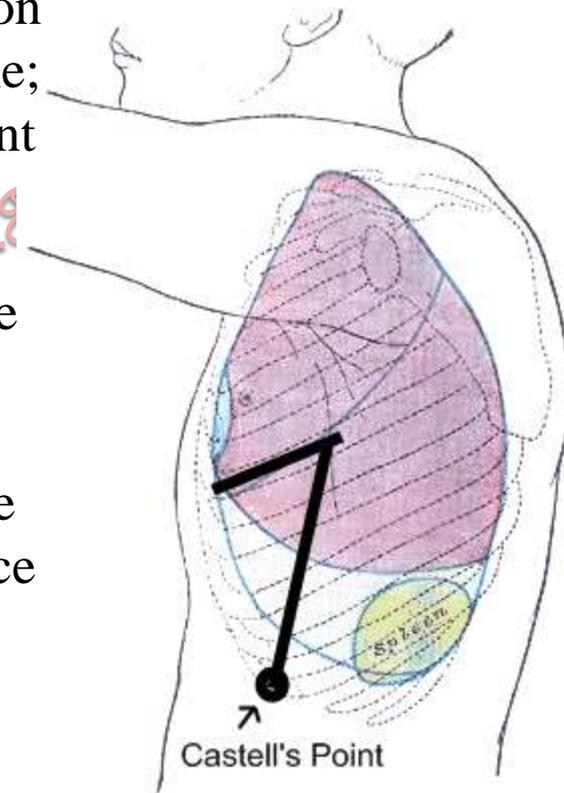
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Castell's sign is a medical sign assessed to evaluate splenomegaly and typically part of an abdominal examination. It is an alternative physical examination maneuver to percussion over Traube's space.

Castell's point

Refer to line number 4 above. Castell's point at the junction of the lowest intercostal space and the anterior axillary line; thus it is at the lower lateral corner of Traube's space (point "C" in the image).

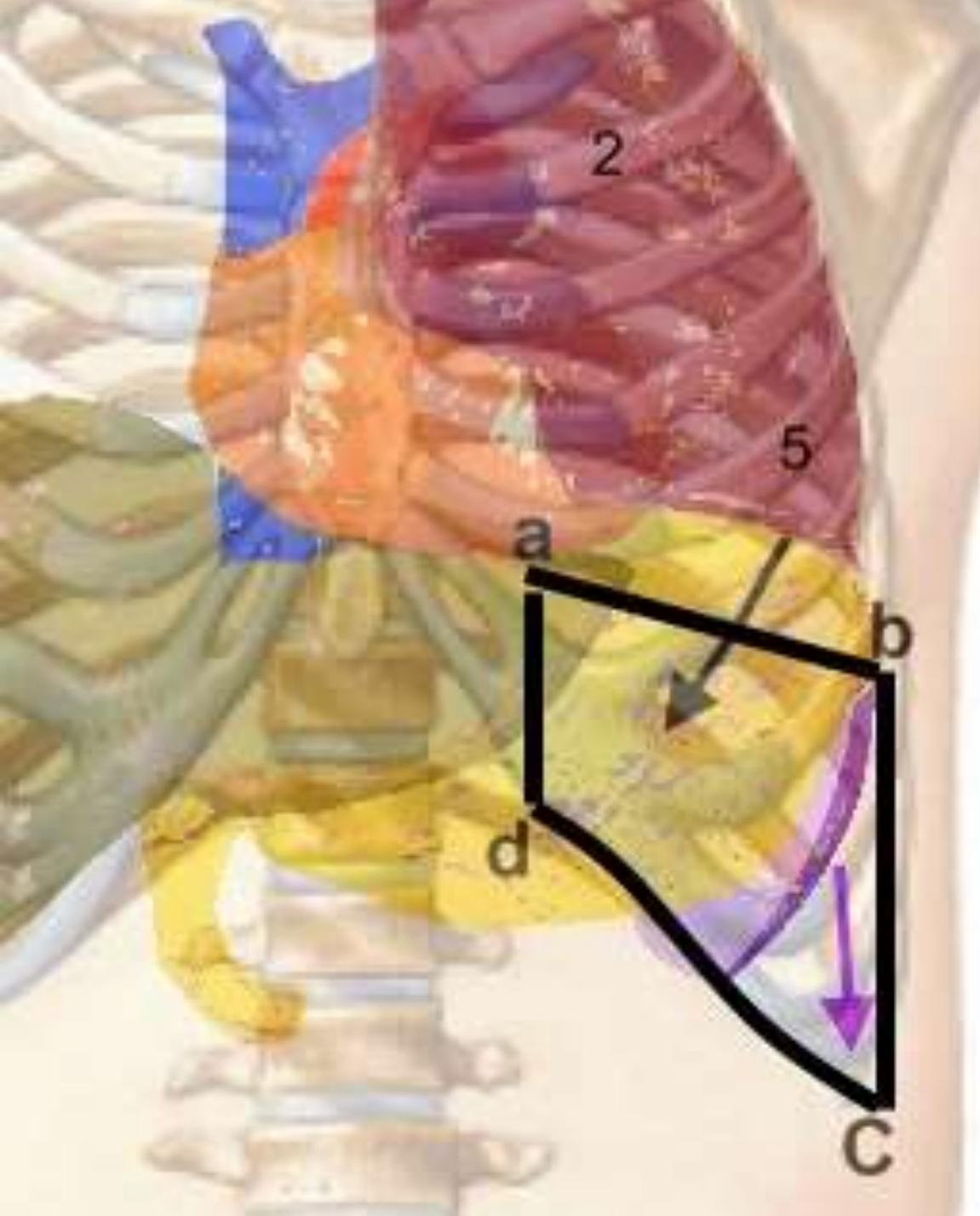
Traube's (semilunar) space is an anatomic space of some clinical importance. It is a crescent-shaped space, encompassed by the lower edge of the left lung, the anterior border of the spleen, the left costal margin and the inferior margin of the left lobe of the liver. Thus, its surface markings are respectively the left sixth rib superiorly, the left mid axillary line laterally, and the left costal margin inferiorly.



Percussion of Traube's Space

- Percussion of Traube's Space
 - boundaries -Left anterior axillary line, 6th rib, costal margin
 - this area should be resonant on percussion
 - dullness indicates possible splenic enlargement

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This picture gives an approximate idea of the space. The lines are not precise, since a 3-dimensional image is converted into a 2-D image. a, b, c, and d are the points referred to in the description. During deep inspiration the lung moves downwards (black arrow), and the spleen moves downwards (maroon arrow).

Traube's space

It is a (roughly) quadrilateral area on the left lower chest. It is normally resonant due to the underlying gastric fundus, and loses its resonance in certain conditions.

The space was described by Ludwig Traube (1818-1876), a German physician. One can map Traube's space as follows:

- ❖ Drop a perpendicular line from the sixth rib at the costochondral junction (point “a” in the image) till the costal margin (point “d” in the image”) (this represents the medial border. The left edge of the liver touches this line.);
- ❖ Drop another perpendicular line from the ninth rib at the anterior axillary line (point “b” in the image) to the costal margin (point “C” in the image) (this represents the lateral border. The medial border of the spleen touches this.);
- ❖ Join the tops of the two perpendicular lines (this represents the upper border. The lower border of the heart touches this.);
- ❖ Complete the quadrilateral by using the costal margin to join the lowest points of the perpendicular lines.

Importance of Traube's space

Traube described his space for help with the diagnosis of pleural effusion. Percussion in Traube's space is very resonant, because the stomach bubble lies under it. When the lung expands during deep inspiration, the sound becomes slightly less resonant. This indicates that the lung is capable of expanding. Conversely, in a collapse, the lung retracts, and Traube's space will enlarge.

In pleural effusion the resonant space will shrink or disappear; in other words, the Traube's space becomes dull. Reappearance of resonance indicates resolution of the effusion.

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Importance of Castell's point

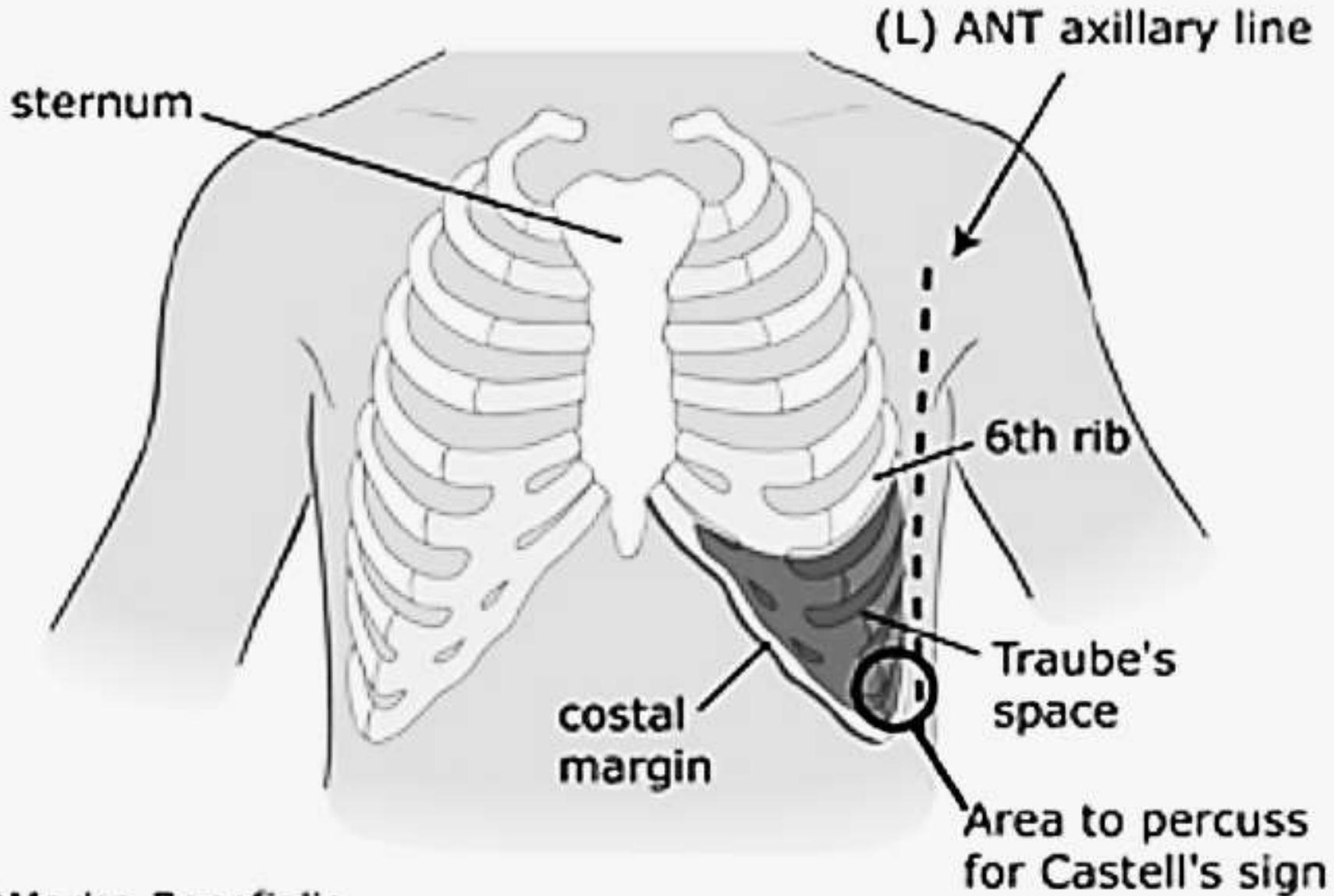
Percussion over Castell's spot helps confirm minimal splenic enlargement (in cases where the spleen is not obviously palpable). The examiner percusses over the lowest intercostal space in the left anterior axillary line in both expiration and full inspiration. Normally, the spot is resonant; in splenic enlargement there is dullness at this spot, or it appears after full inspiration.

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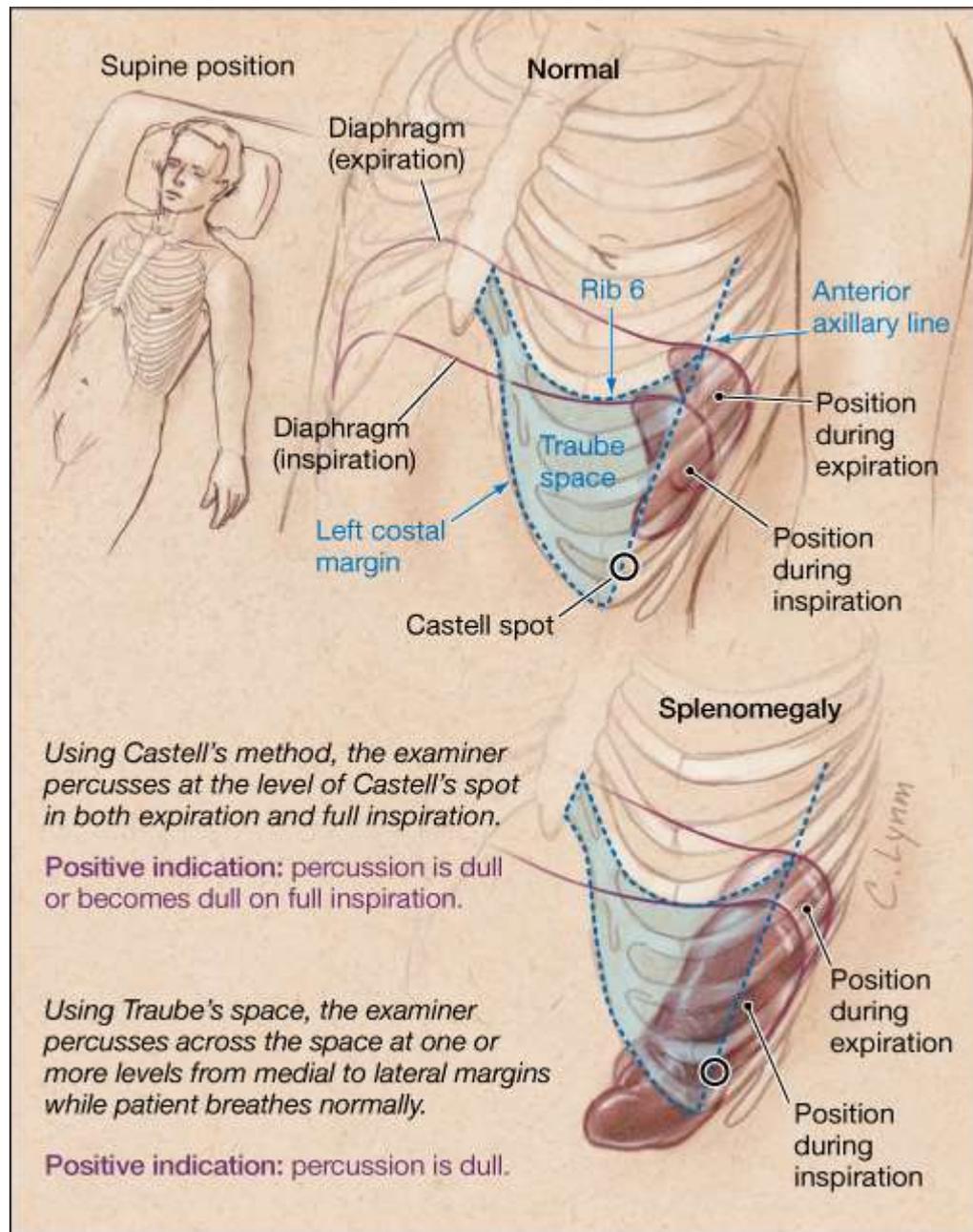
Percussion by Castell's Method

- Percussion by Castell's method
 - percuss in the lowest Left intercostal space in the anterior axillary line (usually the 8th or 9th IC space)
 - this space should remain resonant during full inspiration
 - dullness on full inspiration indicates possible splenic enlargement (a positive Castell's sign)

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Source: Simel DL, Rennie D: *The Rational Clinical Examination: Evidence-Based Clinical Diagnosis*: <http://www.jamaevidence.com>

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Percussion by Nixon's Method

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Percussion by Nixon's Method

- Percussion by Nixon's method
 - place the patient in Right lateral decubitus
 - begin percussion midway along the Left costal margin
 - proceed in a line perpendicular to the Left costal margin
 - if the upper limit of dullness extends >8 cm above the Left costal margin, this indicates possible splenomegaly

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*Right lateral
decubitus position*

midaxillary line

xiphoid process

(L) costal margin

midpoint

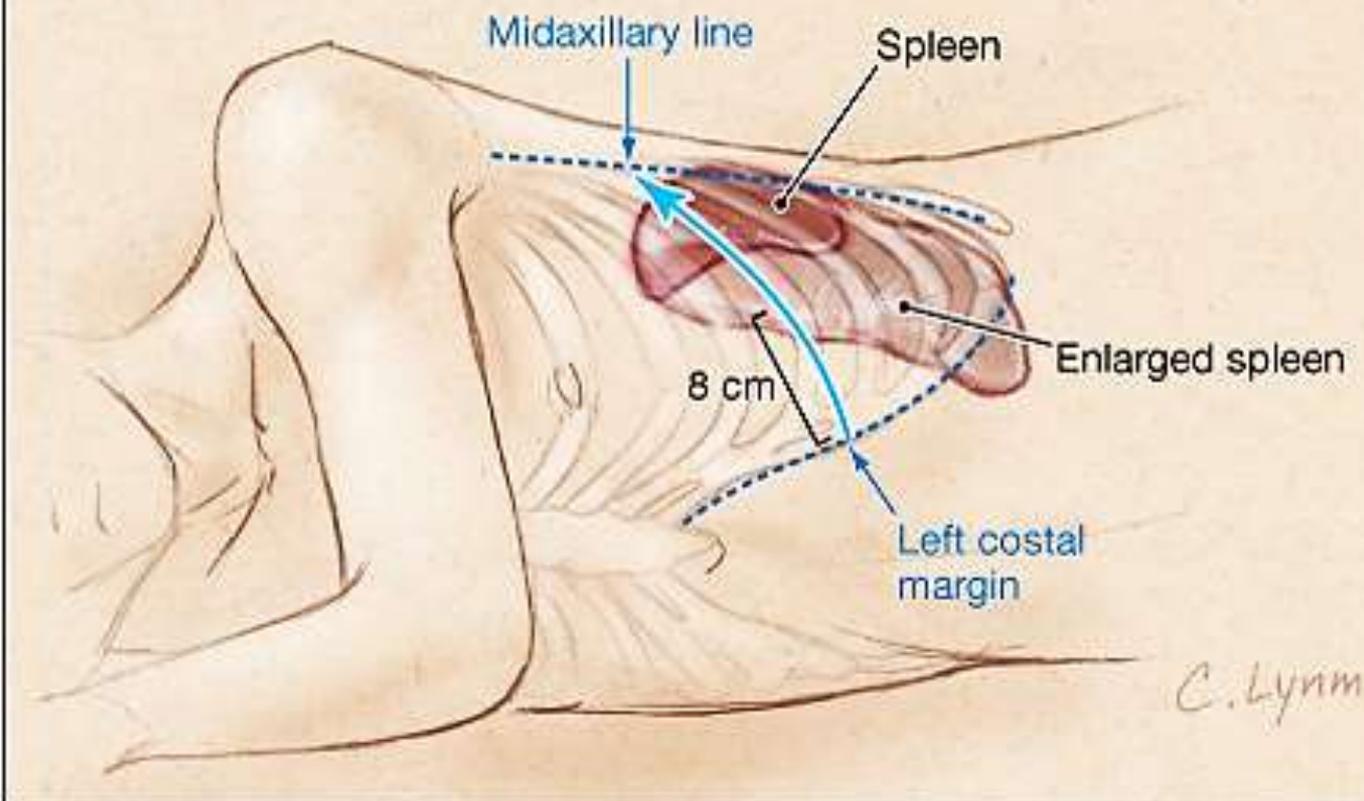


Right lateral decubitus position



Examiner begins percussion at midpoint of left costal margin in a perpendicular direction towards the midaxillary line.

Positive indication: dullness is present more than 8 cm above the costal margin.

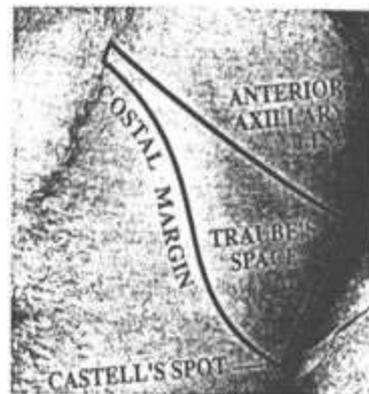
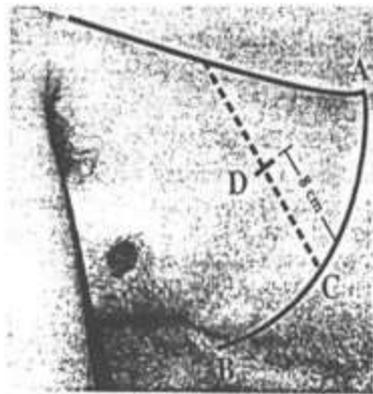


Source: Simel DL, Rennie D: *The Rational Clinical Examination: Evidence-Based Clinical Diagnosis*: <http://www.jamaevidence.com>

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PERCUSSION OF TRAUBE'S SPACE – SIXTH RIB SUPERIORLY, MIDAXILLARY LINE LATERALLY AND LEFT COSTAL MARGIN INFERIORLY. NORMALLY THE PERCUSSION NOTE IS RESONANT. DULLNESS IMPLIES SPLENOMEGALY.

NIXON'S METHOD – PERCUSS MIDWAY ALONG LEFT COSTAL MARGIN. NORMALLY DULLNESS DOES NOT EXTEND FURTHER THAN 8 CM ABOVE THE COSTAL MARGIN.



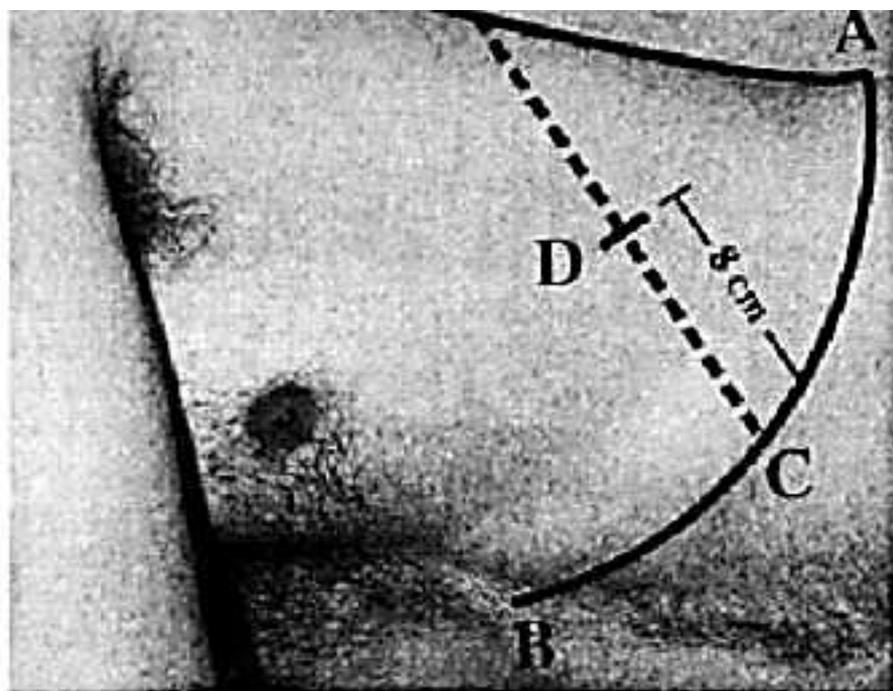


Fig 3.—Nixon's method of percussion requires that the patient be placed in the right lateral decubitus position. Percussion is started at the midpoint (C) of the left costal margin (AB) and proceeds perpendicularly (CD). Splenomegaly is diagnosed if the upper limit of dullness extends more than 8 cm above the costal margin (above D).

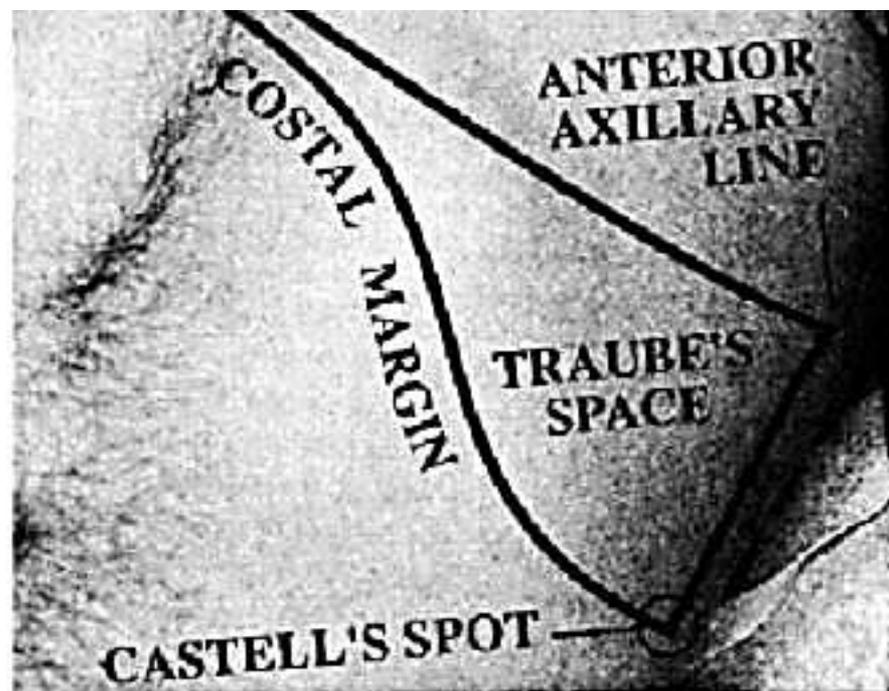
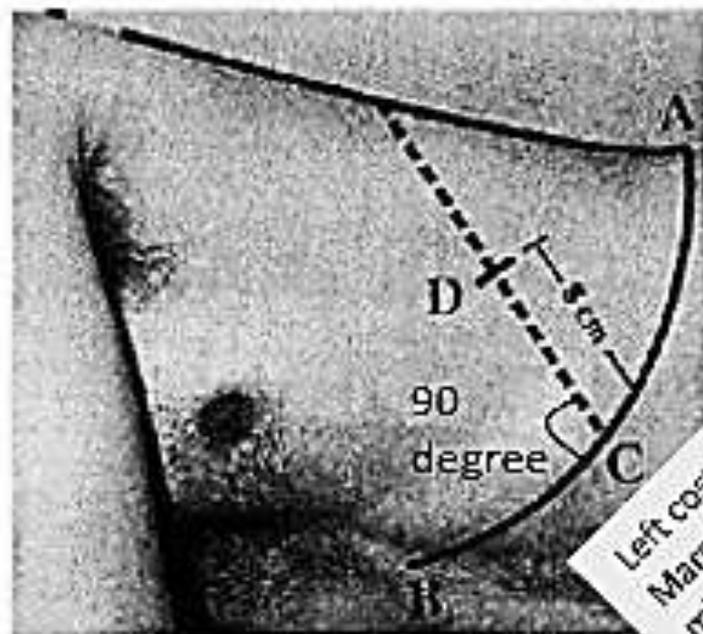
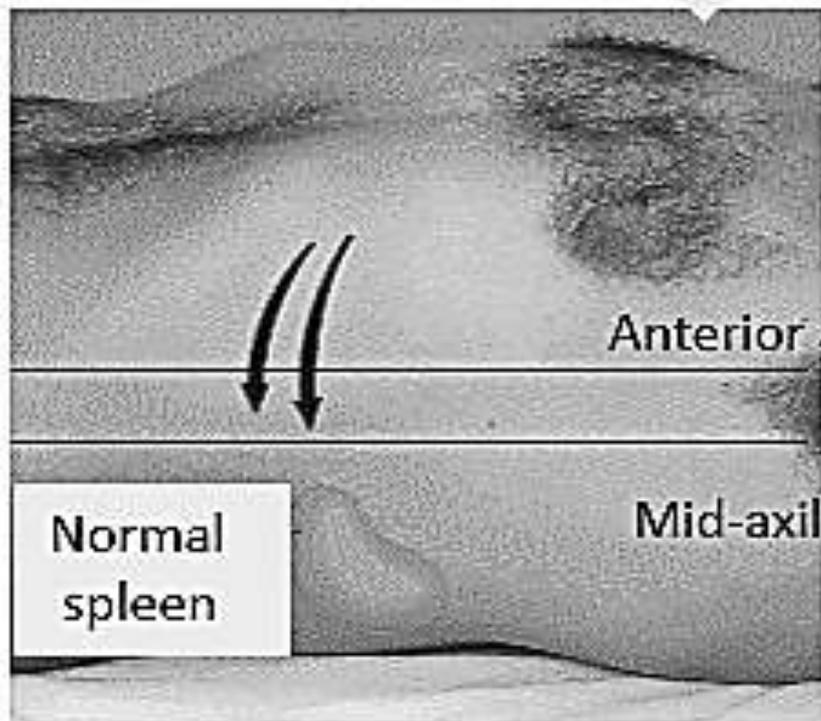
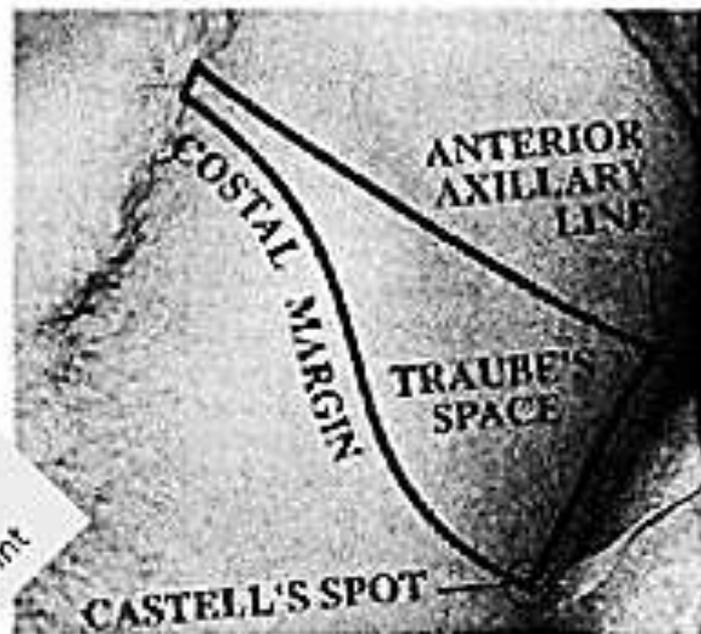


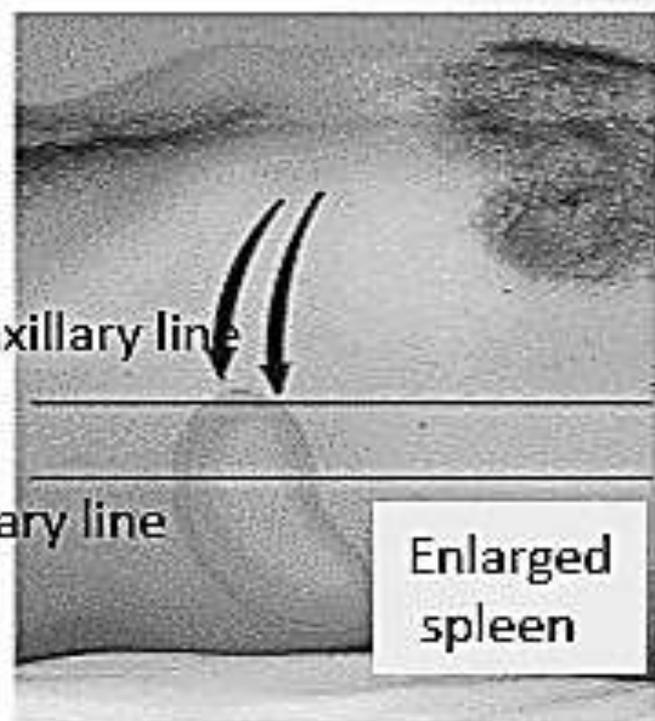
Fig 4.—Traube's space is defined by the sixth rib superiorly, the left anterior axillary line laterally, and the costal margin inferiorly. Castell's spot is located at the junction of the lowest intercostal space and the left anterior axillary line.



Left costal
Margin
midpoint



Normal
spleen



Enlarged
spleen

In Summary

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Traube's semilunar space

Borders:

Superiorly: Left 6th rib superiorly

Laterally: Left midaxillary line or Left anterior axillary line

Inferiorly: Left costal margin

Method:

Patient's position: supine with left arm slightly abducted.

Percuss: from medial to lateral

Interpretation:

Resonance (Normal) and Dullness (Splénomegaly).

DDx:

Pleural effusion or mass in stomach may cause dullness in Traube's space.

Castell's method

Percuss:

In the lowest intercostal space in the anterior axillary line (8th or 9th)

Interpretation:

- Resonant percussion note on expiration or full inspiration: is normal.
- Dull percussion note on full inspiration: splenomegaly

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Nixon's method

Patient's position:

Right lateral decubitus (rationale: spleen comes to lie above colon and stomach).

Percuss:

Start percussing midway along the left costal margin and proceed in a line perpendicular to left costal margin

Interpretation:

Upper limit of dullness >8 cm above costal margin: Splenic enlargement

Before you finish the examination of the spleen you have to ensure that you assess :

A- General lymph nodes examination :

1- Cervical lymph nodes.

2- Axillary lymph nodes.

3- Inguinal lymph nodes.

- Intra-abdominal lymph nodes can be radiologically assessed by abdominal CT – scan.

B- Liver.

C- Ascites and Portal hypertension.

D- Bone marrow disorders.

E- Bleeding disorders.

This section will be discussed in the next clinical series.

HEAD-TO-TOE ASSESSMENT

Physical Assessment using head toe approach

General

General health status
Vital signs and weight
Nutritional status

Mobility and self care

Observe posture
Assess gait and balance
Evaluate mobility
Activities of daily living

Head face and neck

Evaluate cognition
LOC
Orientation
Mood
Language and memory
Sensory function
Test vision
Inspect and examine ears

Test hearing
Cranial nerves
Inspect lymph nodes
Inspect neck veins

Chest

Inspect and palpate breast
Inspect and auscultate lungs
Auscultate heart

Abdomen

Inspect, auscultate, palpate four quadrants
Palpate and percuss liver, stomach, bladder
Bowel elimination
Urinary elimination



**What is beyond the
mind ?
I can not be alone.
I need the Help and
Guidance of ALLAH
the Grand Almighty.**

