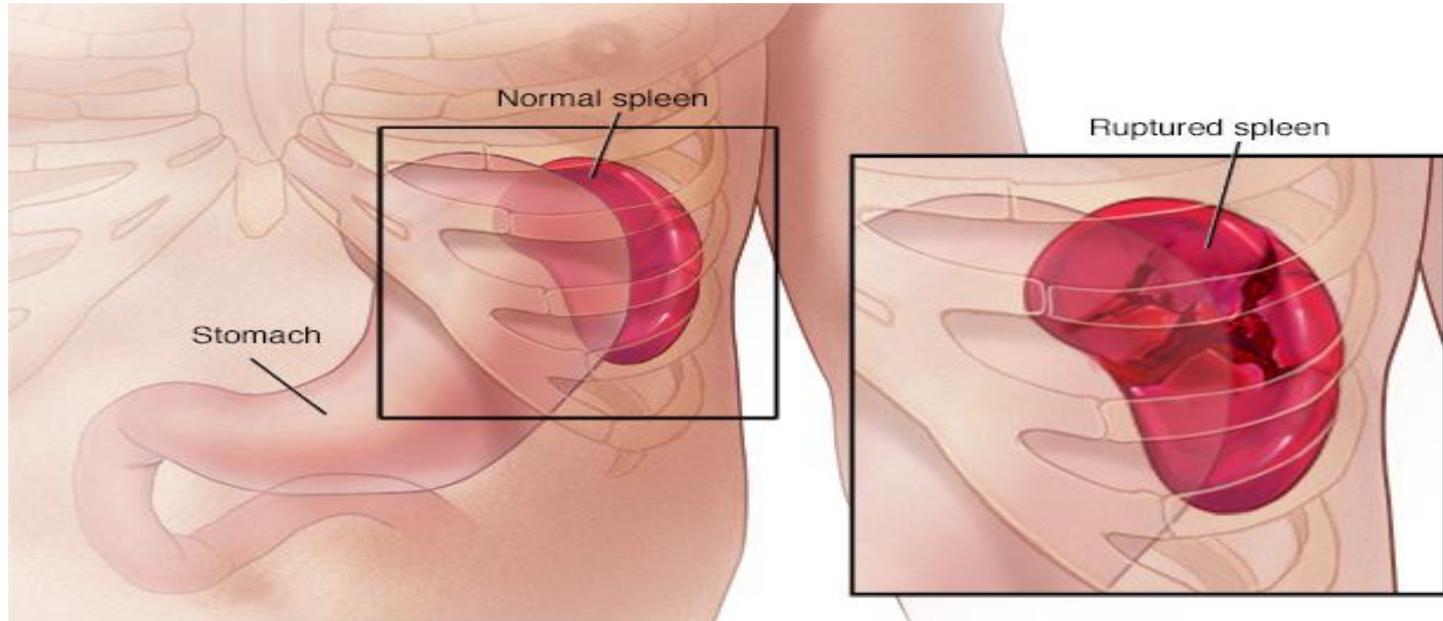


# SPLENIC SALVAGE PROCEDURE



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**PROF. DR / ALAA EL - SUITY**

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## The **Odd numbers of Harris**

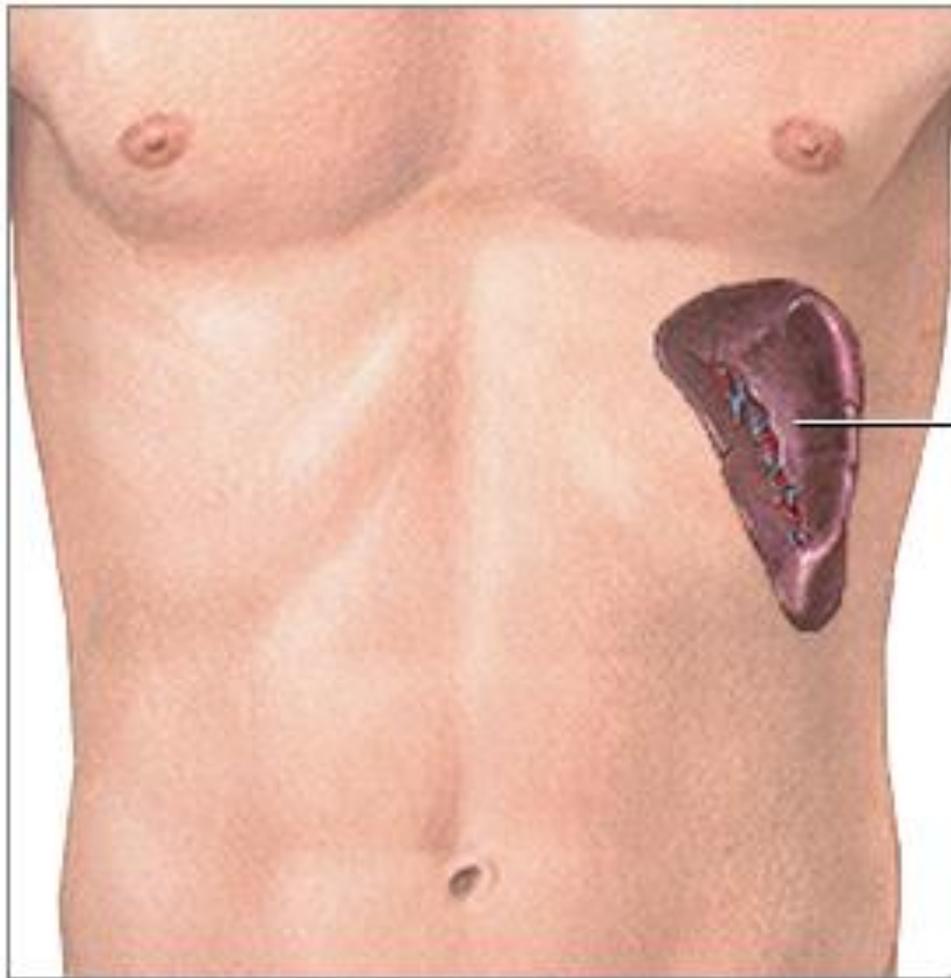
**(1, 3, 5, 7, 9, 11)**

**summarize certain statistical features of Spleen.**

**Size : 1 x 3 x 5 inches**

**Weight : 7 ounces (150-200 gm)**

**Site : It hypochondrium opposite to the 9<sup>th</sup>, 10<sup>th</sup> & 11<sup>th</sup> ribs ith it's long axis parallel to the 10<sup>th</sup> rib .**



Spleen

## **2 borders :**

**Superior border :**

**sharp , usually has a notch**

**Inferior border :**

**rounded & smooth**

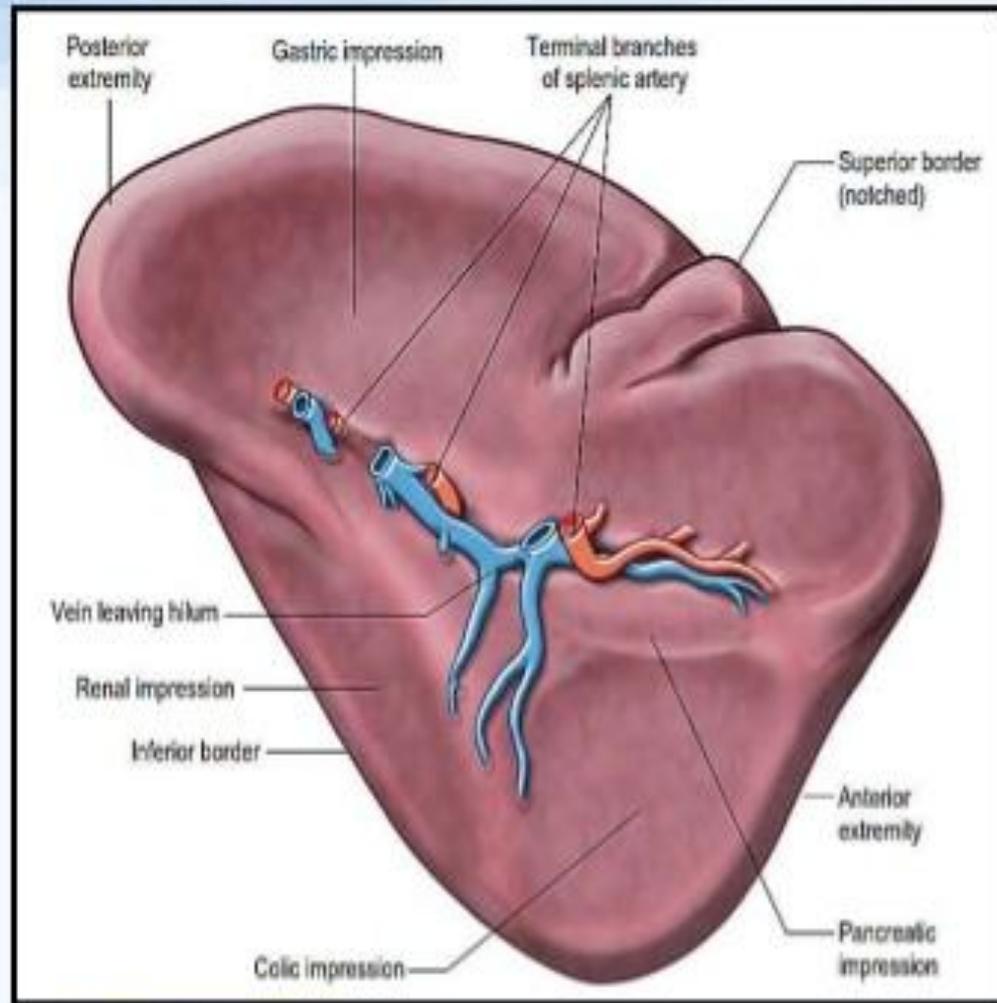
## **2 surfaces :**

**Diaphragmatic surface :**

**related to diaphragm**

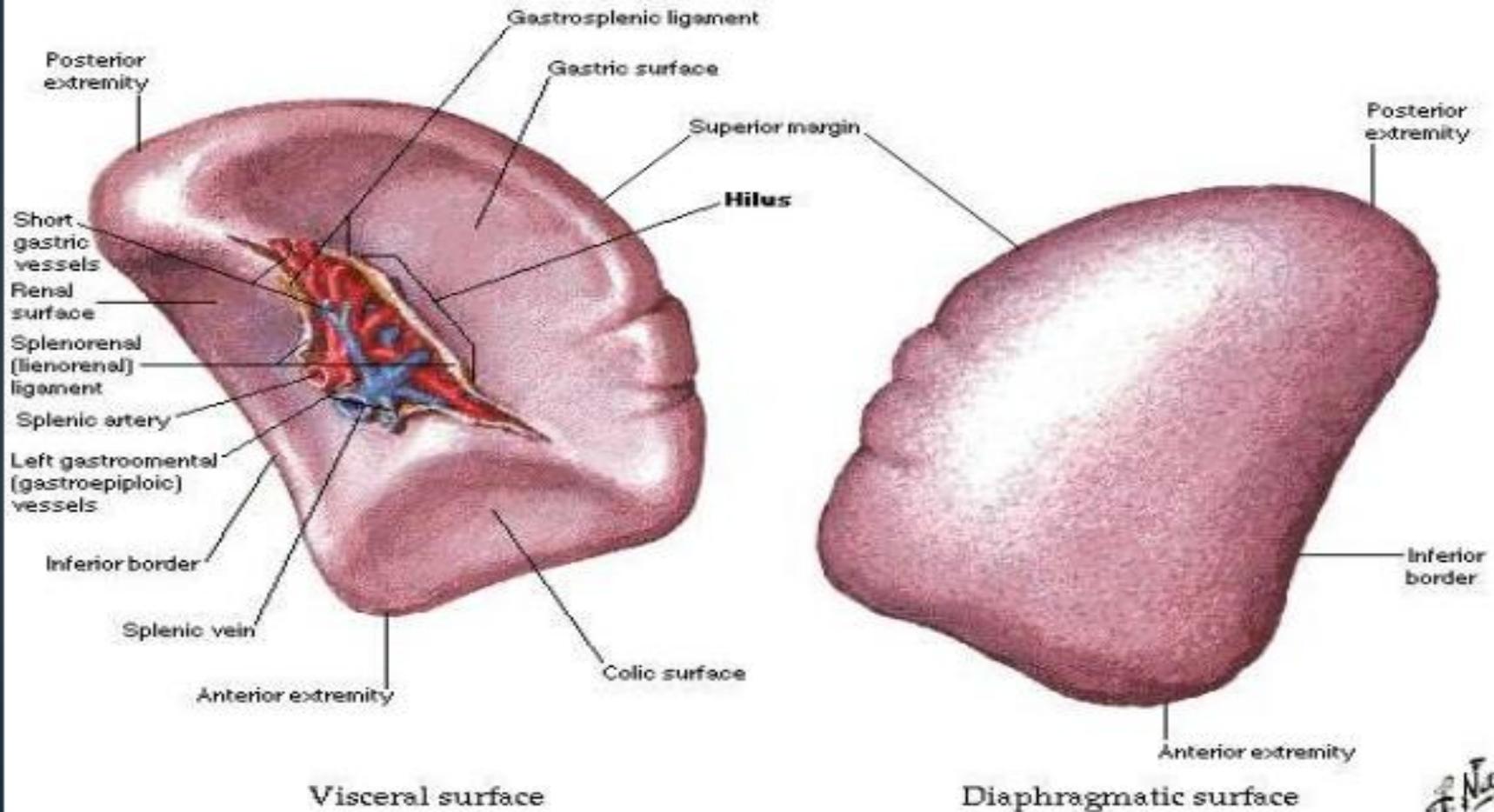
**Visceral surface :**

**has 4 impressions and the hilum.**

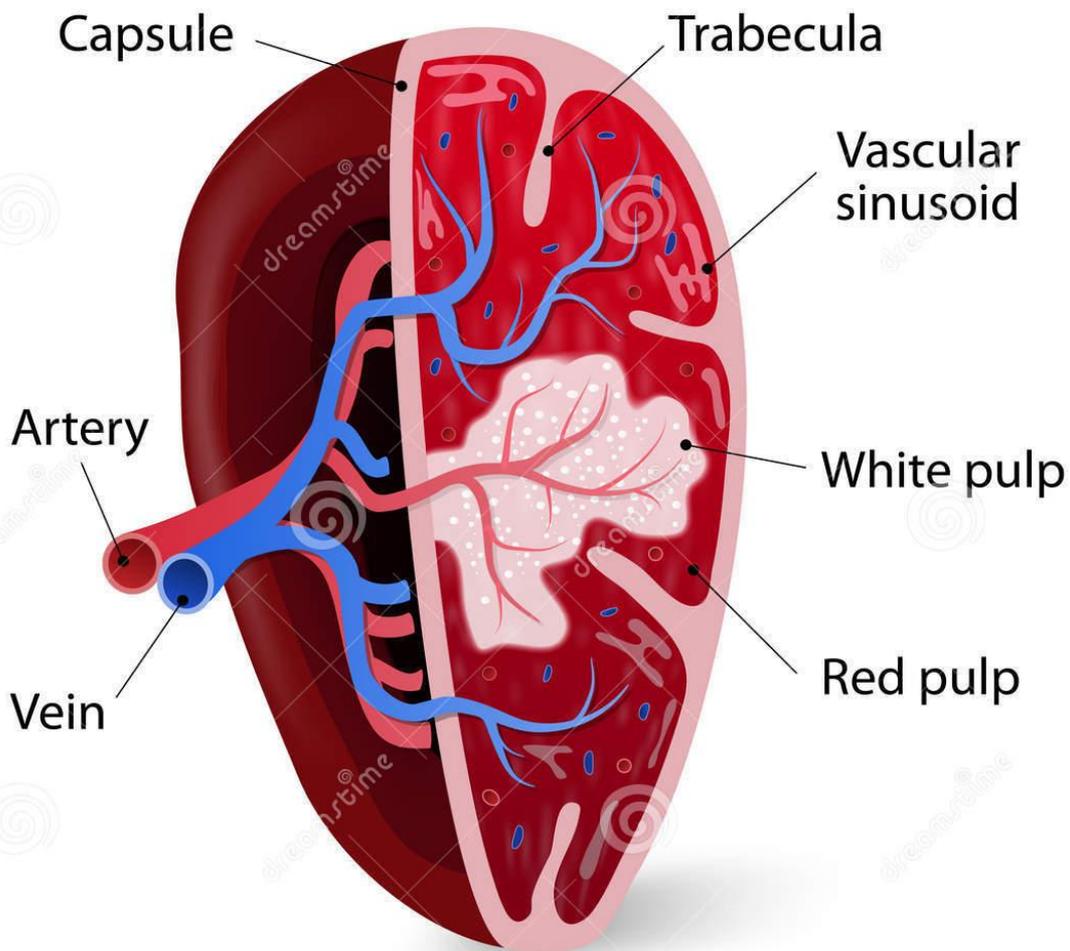


# Spleen

## Visceral and Diaphragmatic Surfaces



# SPLEEN ANATOMY



## Arterial supply :

**Splenic a.** >> a branch of the **celiac trunk** .

## Venous drainage :

**Splenic vein** >> receives the inf. Mesenteric v. then unites with the Sup. Mesenteric v. to form the **portal v.**

## Lymph Drainage :

to the **Aortic LNs** around the celiac trunk.

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## **Indications :**

**Injuries to spleen when patient is haemodynamically stable.**

## **Contraindications :**

- **Haemodynamically instability .**
- **Life threatening concomitant injuries which are likely to cause haemodynamic compromise in the postoperative period. E.g severe liver injuries or significant pelvic fractures.**
- **Coagulopathy.**
- **Grade V injuries.**

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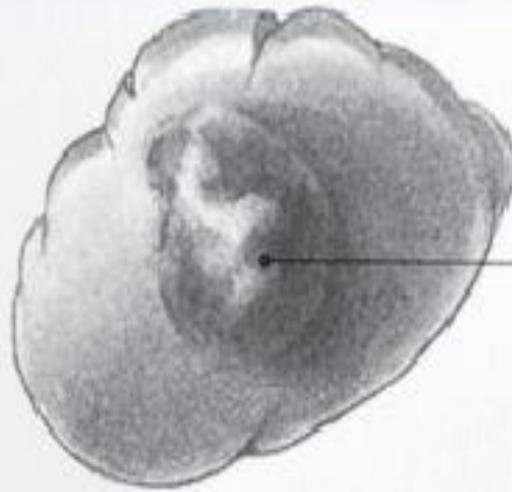
## **Types of splenic injury :**

" According to the **AAST** "

**American Association of  
Surgery for Trauma**

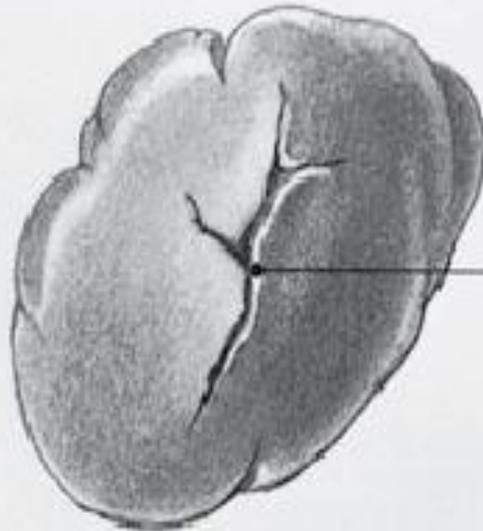
	<b>Haematoma</b>	<b>Laceration</b>
<b>Grade I</b>	subcapsular haematoma <b>&lt; 10 %</b> of surface area	capsular tear <b>&lt; 1 cm</b> paranchymatous depth
<b>Grade II</b>	subcapsular ( <b>10 – 50 %</b> ) surface area or intraparanchymal <b>&lt; 5 cm</b> diameter	1-3 cm paranchymatous depth that doesn't involve trabecular vessels
<b>Grade III</b>	Haematoma : subcapsular <b>&gt; 50 %</b> surface area or rupture subcapsular or expanding paranchymatous	<b>&gt;3 cm</b> paranchymatous depth or involving trabecular vessels
<b>Grade IV</b>	ruptured intraparanchymal	involve segmental or hilar vessels producing major devascularization of <b>&gt;25 %</b> of spleen
<b>Grade V</b>		<b>Completely shattered</b> spleen or hilar vascular ring that devascularize spleen <b>completely</b>

Grade I



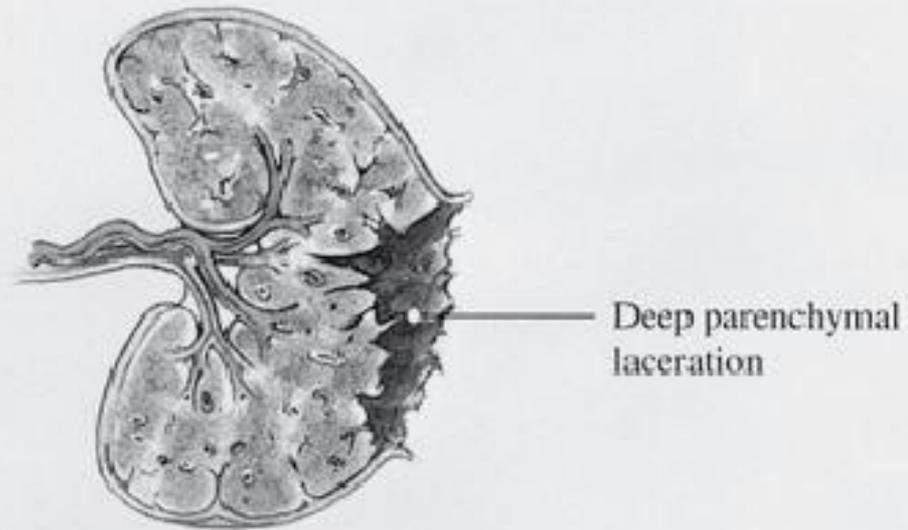
Small non-expanding  
subcapsular hematoma

Grade II



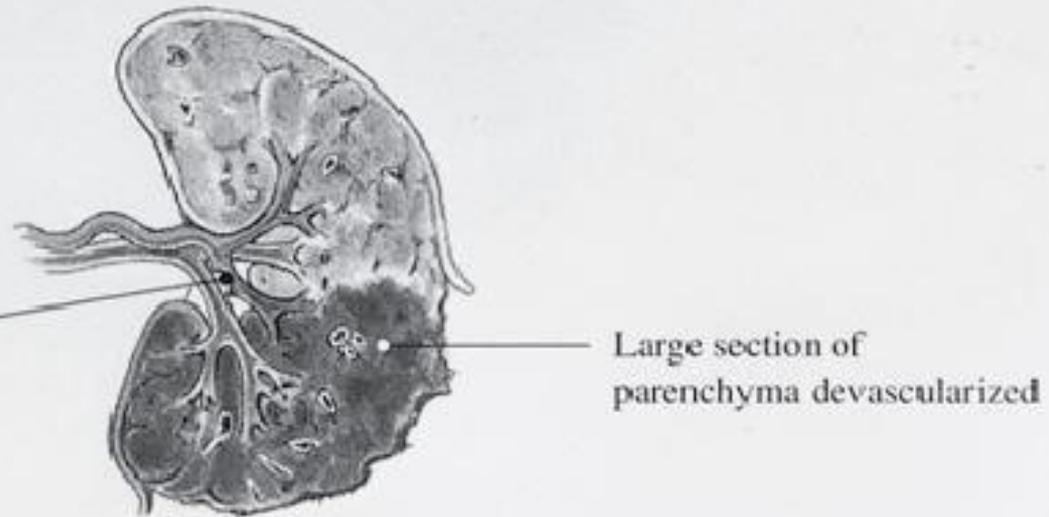
Capsule split

Grade III



Grade IV

Art. injured



Grade V

Avulsion:  
splenic artery, vein



Transhilar injury

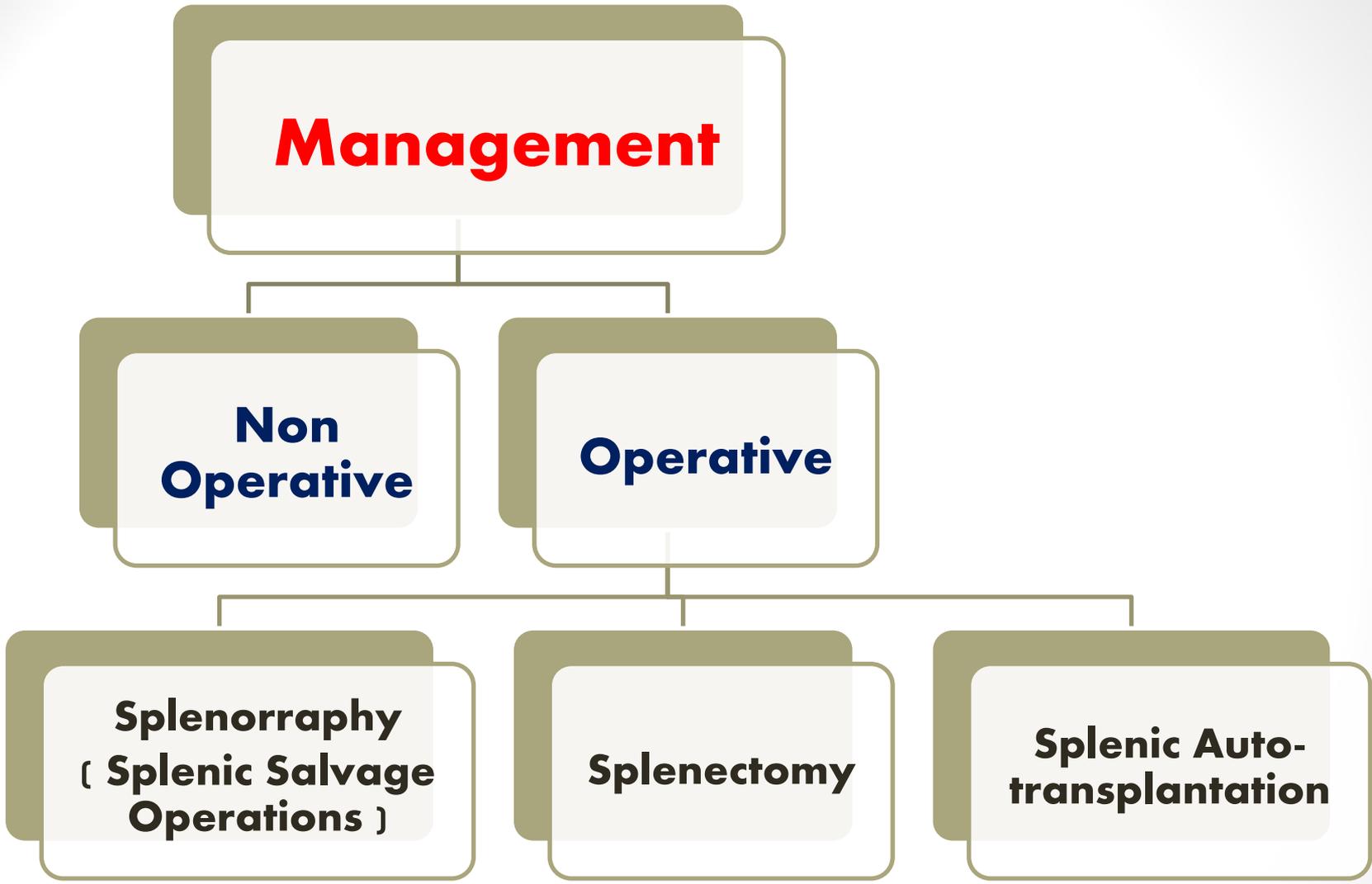
Source: Mattox KL, Moore EE, Feliciano DV: *Trauma, 7th Edition*:  
[www.accesspharmacy.com](http://www.accesspharmacy.com)

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# Management



```
graph TD; Management[Management] --> NonOperative[Non Operative]; Management --> Operative[Operative]; Operative --> Splenorraphy["Splenorraphy ( Splenic Salvage Operations )"]; Operative --> Splenectomy[Splenectomy]; Operative --> SplenicAuto["Splenic Auto-transplantation"];
```

The diagram is a hierarchical flowchart. At the top level is a box labeled 'Management'. A line from this box branches into two boxes: 'Non Operative' on the left and 'Operative' on the right. From the 'Operative' box, a line branches into three boxes: 'Splenorraphy ( Splenic Salvage Operations )', 'Splenectomy', and 'Splenic Auto-transplantation'.

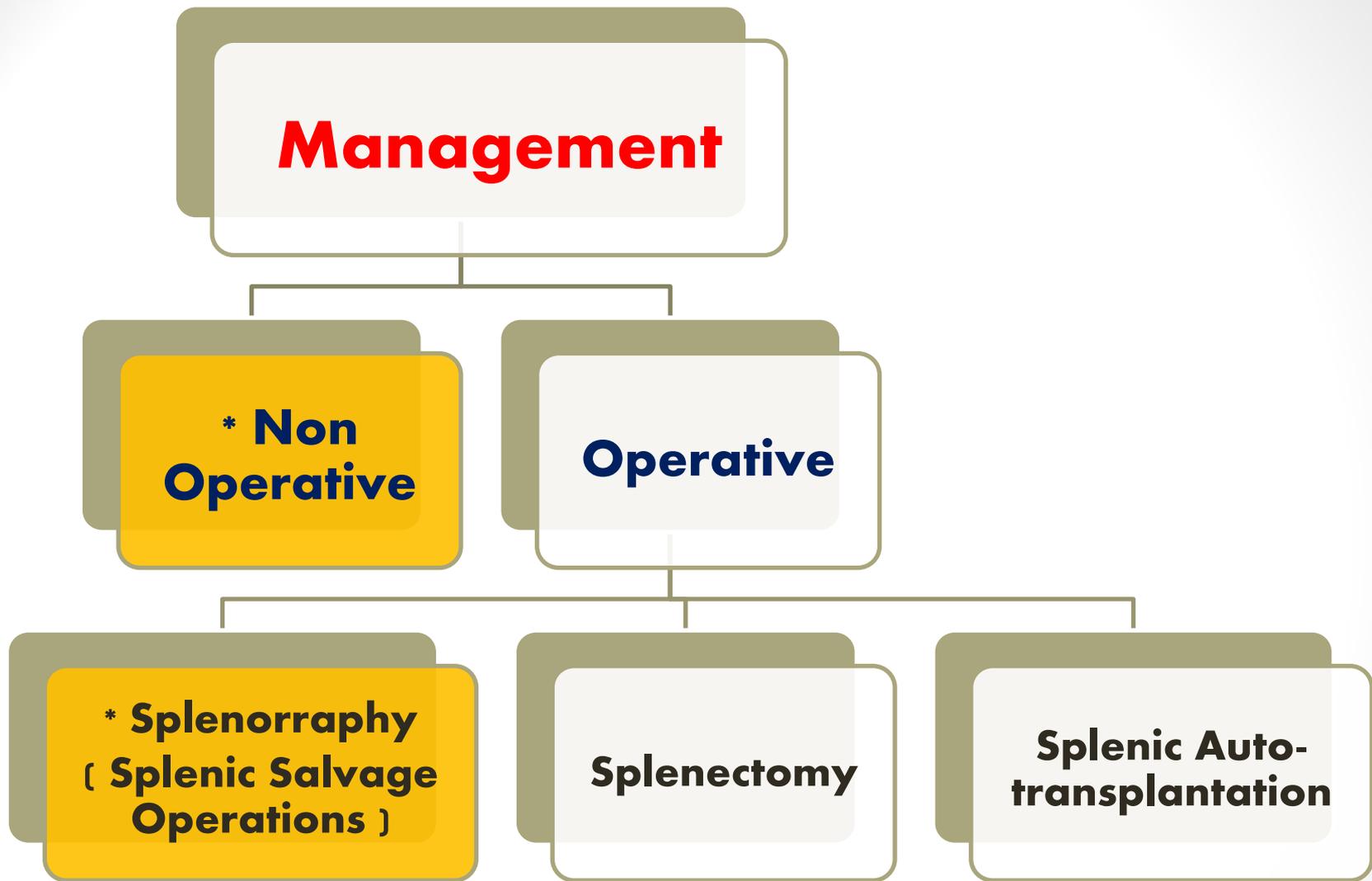
**Non  
Operative**

**Operative**

**Splenorraphy  
( Splenic Salvage  
Operations )**

**Splenectomy**

**Splenic Auto-  
transplantation**



**\*\* Splenic Salvage Procedure**

# Non operative treatment of injured spleen

## Indications :

- 1- haemodynamically stable.
- 2- blood requirements < 2 units
- 3- no evidence of peritonitis
- 4- CT scan shows :
  - Grade I , II
  - No contrast extravasation
  - No other injured organs

# Protocol :

1- Strict bed rest

2- Regular observation of vital signs

3- Measurement of HB level every 8 hrs

4- Serial abdominal examination to detect early signs of peritonitis

5- If the patient is grade I, II & remain stable for 48 hrs with benign abdominal examination >>> discharge after 5 days of trauma & follow up after 4 weeks by CT scan

# Criteria of failure of non operative ttt :

**1- persistent tachycardia and hypertension**

**2- Blood requirements > 2 units**

**3- peritonitis in physical examination**

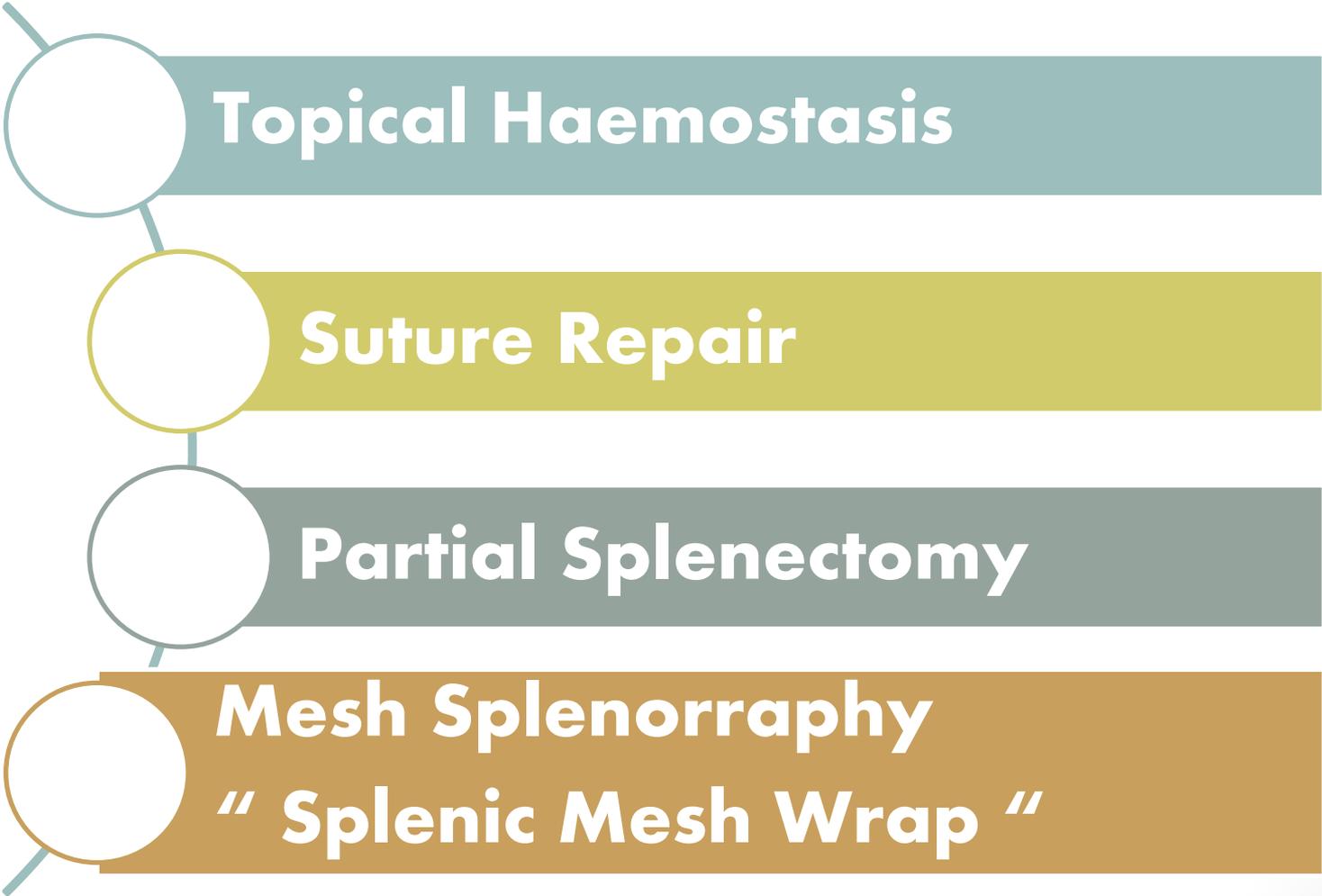
**4- CT scan show :**

- Expansion or rupture of subcapsular haematoma .
- New extravasation
- ↑ of haemoperitoneum

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# Splenic Salvage Operations



**Topical Haemostasis**

**Suture Repair**

**Partial Splenectomy**

**Mesh Splenorraphy**  
**“ Splenic Mesh Wrap ”**

# 1- Topical haemostasis :

## Indications :

**small splenic injuries**

## Methods :

- **Gel Foam**

- **Surgicel**

- **Avitene**

- **fibrin glue** ( combination of topical thrombin – Ca gluconate – cryo precipitate ) ... Success rate 86 %

- **Laser** ( argon beam )

- **Big intensity U/S**

## Topical intraperitoneal hemostatic agents

AGENT	WHAT IT IS	HOW IT IS APPLIED
<b>Avitene Ultrafoam</b>	Absorbable collagen hemostat	powder
<b>Fibrin glue</b>	Equal amounts of cryoprecipitate and thrombin	Spray
<b>Gelfoam</b>	Absorbable gelatin sponge	Cut in strips of appropriate size and apply to area
<b>Surgicel</b>	Oxidized regenerated cellulose	

# 2- Suture repair

## Indication :

**Long deep laceration**

## Method :

**1- Permanent non absorbable monofilaments**

### In Children :

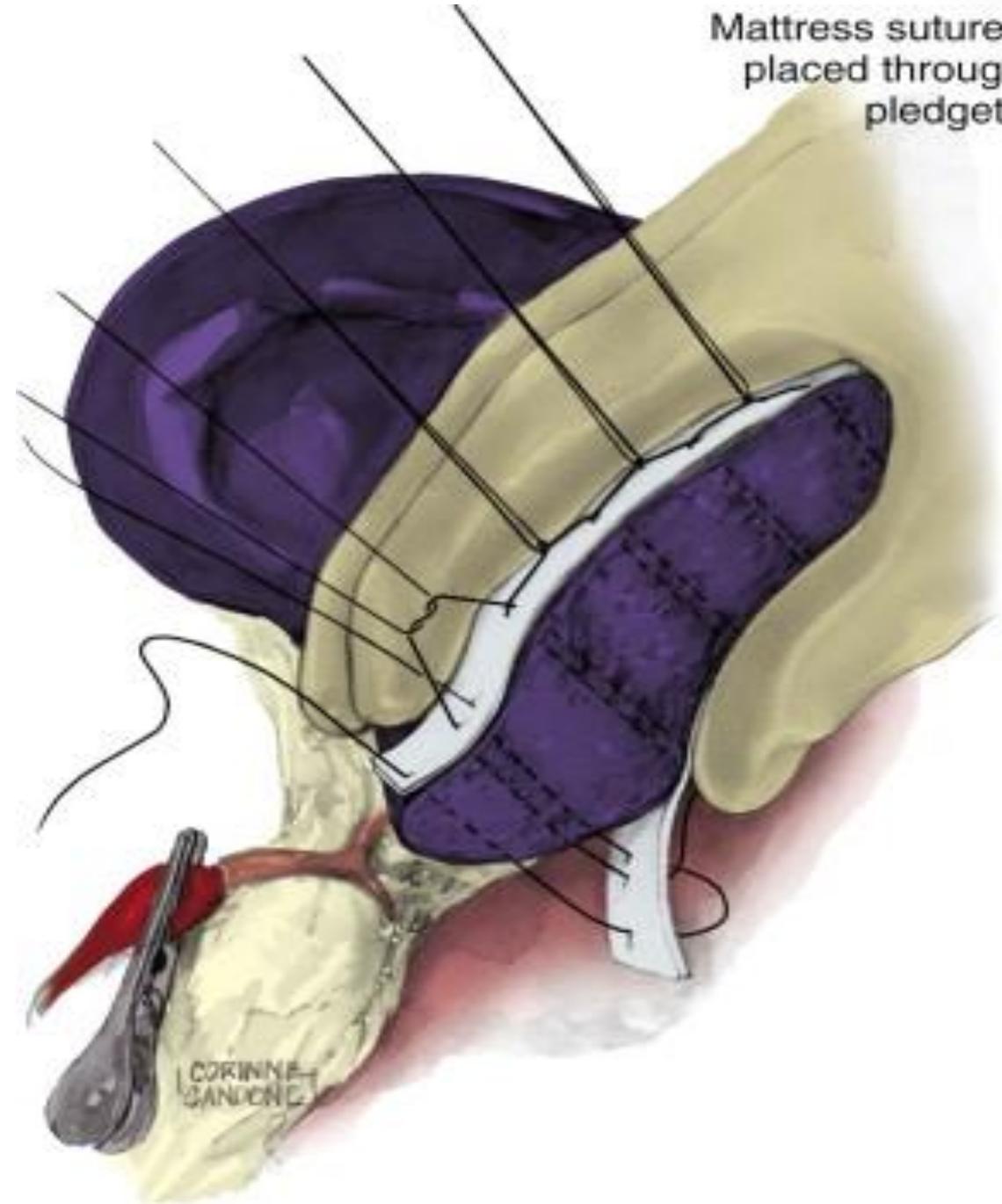
**thick splenic capsule >> firm suture repair**

### In Adult :

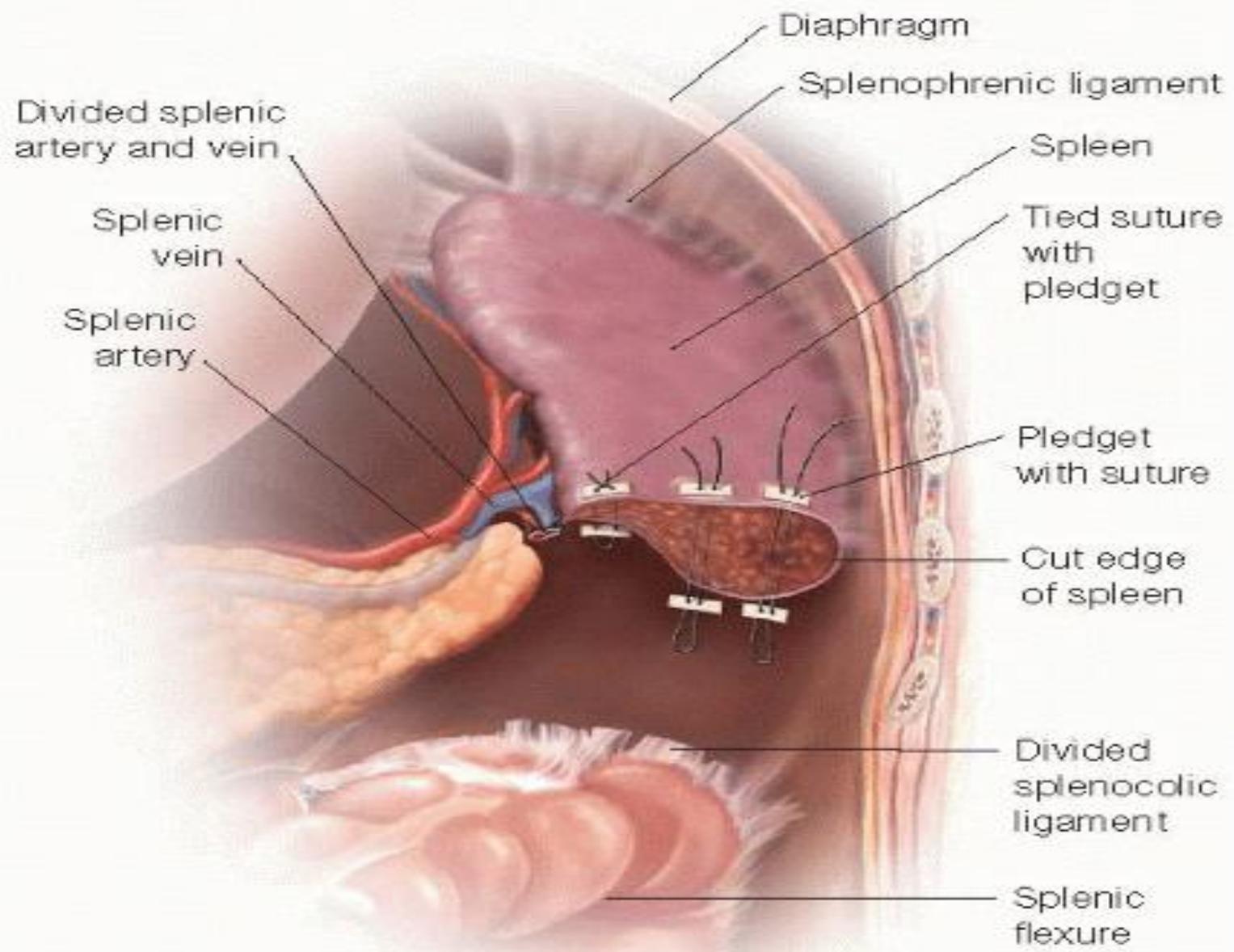
**large pledged horizontal mattress sutures**

**2- package of deep laceration with gel foam , surgical  
, omentum**

Mattress sutures  
placed through  
pledgets



CORINNE SANDONE



# **3- Partial Splenectomy :**

## **Indications :**

**to preserve the immunological function of spleen in traumatized patient .**

## **Methods :**

**Partial resection of injured segment after ligation of appropriate segmental artery .**

## **Preoperative :**

**Give** 1) **polyvalent Anti-pneumococcal vaccine**  
2) **Broad spectrum Antibiotic**

**A**

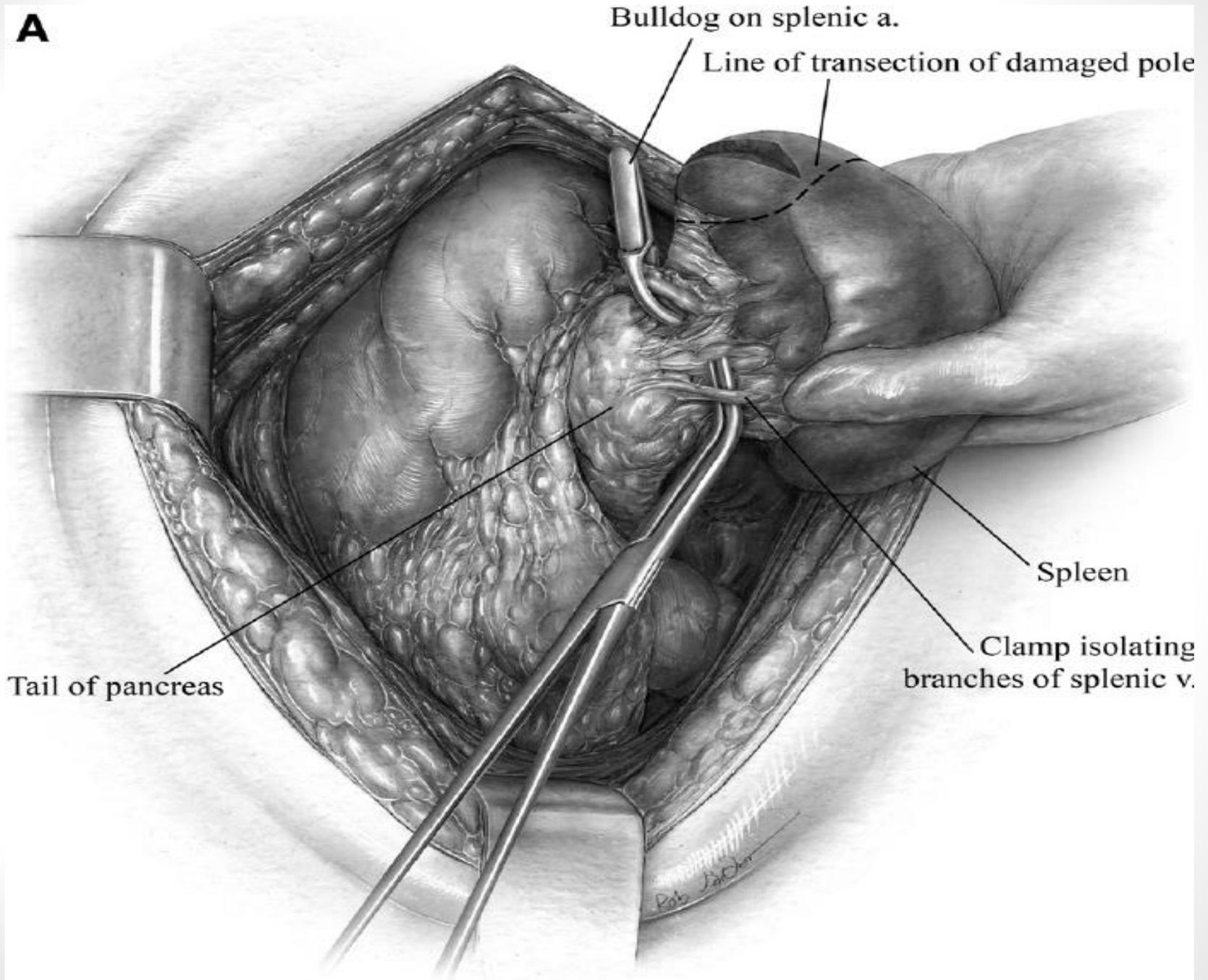
Bulldog on splenic a.

Line of transection of damaged pole

Spleen

Clamp isolating branches of splenic v.

Tail of pancreas



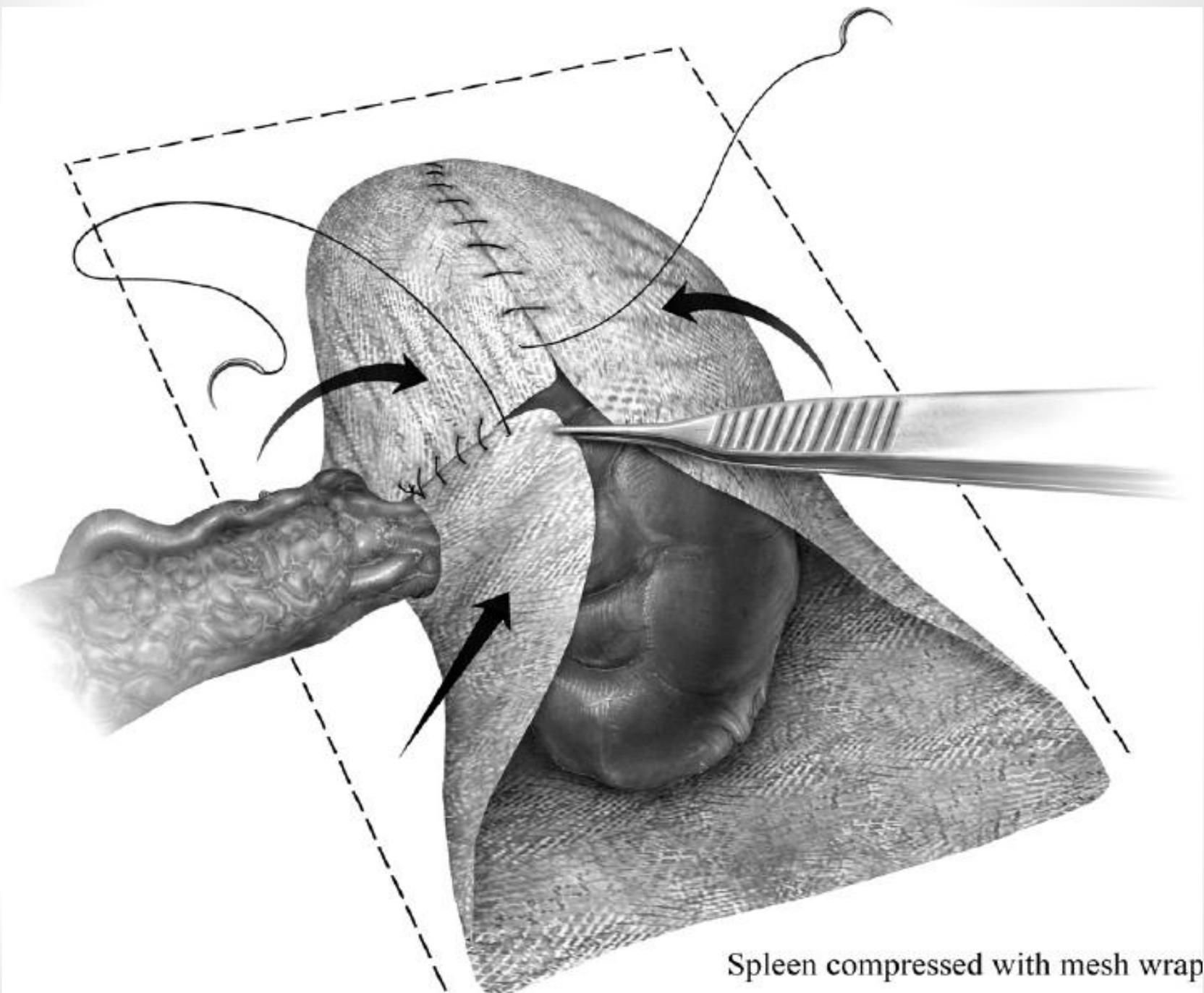
## **4- Mesh splenorraphy " Splenic Mesh wrap "**

### **Indication :**

**Stable Patient with extensive splenic laceration involving loss of substantial amount of Splenic capsule**

### **Method :**

**Placement of spleen in mesh (polyglycolic acid) with small key hole through which splenic hilum pass.**



Spleen compressed with mesh wrap

# **Indications of splenic salvage operation according to type of Injury :**

## **1- Grade I with no active bleeding :**

**Non operative treatment .**

## **2- Grade I or II with active bleeding :**

**Respond well to topical haemostatic agents + direct compression**

## **3- Large injuries :**

**Use – suture repair**

- partial resection**
- application of mesh wrap**

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- Splenic Salvage procedure is indicated in cases of splenic injuries in haemodynamically stable patients .

- **Management of Splenic injuries** consists of **Non Operative treatment & Operative treatment**  
( Splenorrhaphy , Splenectomy , Splenic Autotransplantation )

- **Splenic Salvage procedure = Non Operative treatment + Splenorrhaphy “ Splenic Salvage Operations ”**

- **Splenic Salvage Operations :**

**Topical haemostasis**

**Suturing repair**

**Partial splenectomy**

**Mesh splenorrhaphy**

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danke 謝謝

ngiyabonga  
tesekkür ederim

спасибо

dank je

thank you

gracias

tapadh leat

bedankt

hvala  
mauruuru

dziękuję

moichachkeram

obrigado

sagolun

sukriya kop khun krap

go raibh maith agat

grazie

arigatō

tak

dakujem

merci

terima kasih

감사합니다

ευχαριστώ

merci