Surgical Procedures in Emergency Room

21 June 2010

นพ.ประสิทธิ์ วุฒิสุทธิเมธาวี
ภาควิชาเวชศาสตร์ฉุกเฉิน
คณะแพทยศาสตร์
มหาวิทยาลัยสงขลานครินทร์

Songklanagarind Hospital
Faculty of Medicine, Prince of Songkla University

Rigid sigmoidoscopy

Paraphimosis reduction

Compartment pressure measurement

Rigid sigmoidoscopy

Advantages

Measuring distance

Unprepared bowel

Large lumen

Rigid sigmoidoscopy

Disadvantages

Pain

Rectal injury

Rigid sigmoidoscopy

Indications

Use in ED

Unprepared bowel

Remove F.B.

Reduction of sigmoid volvulus

Rigid sigmoidoscopy

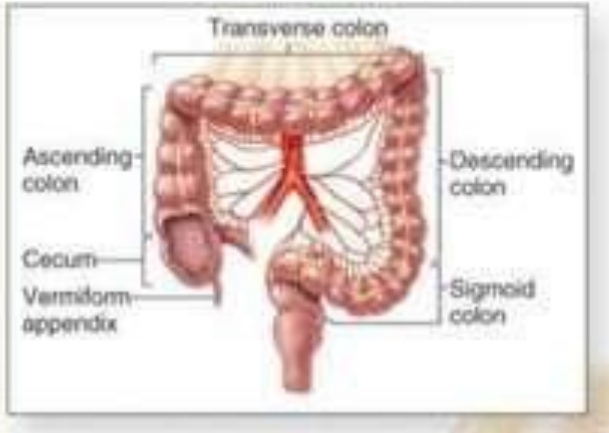
Contraindications

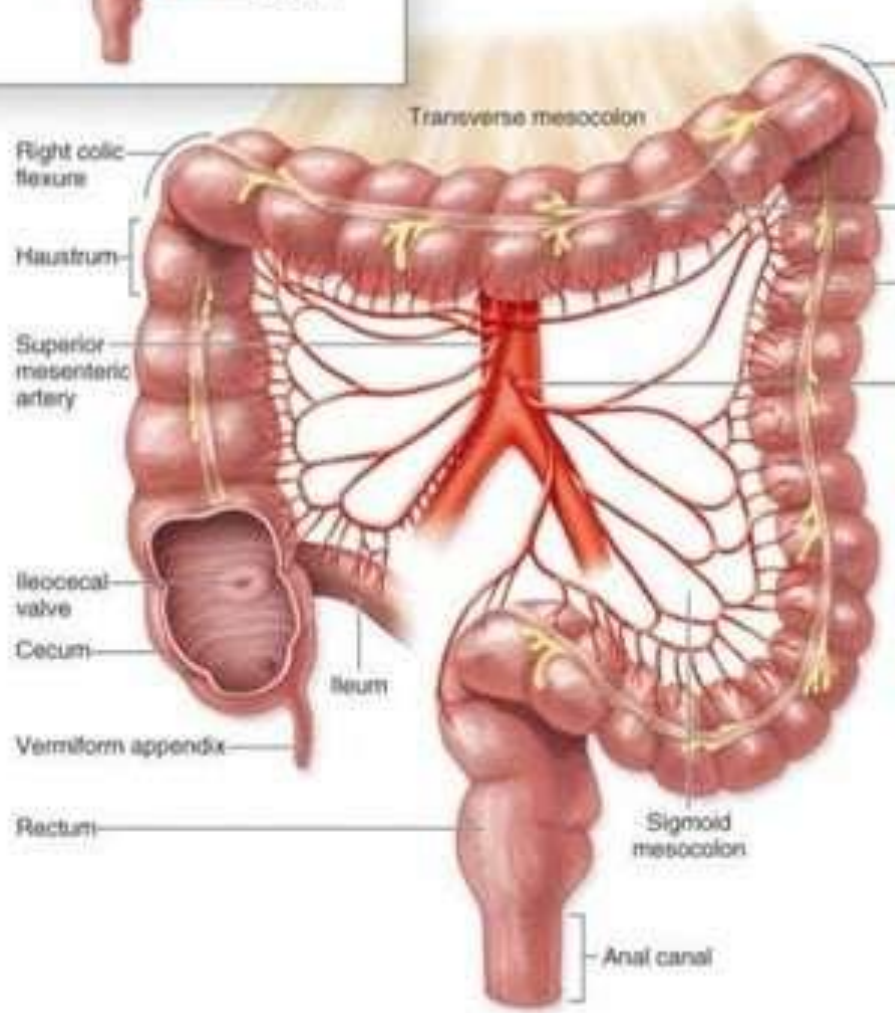
Severe anal pain

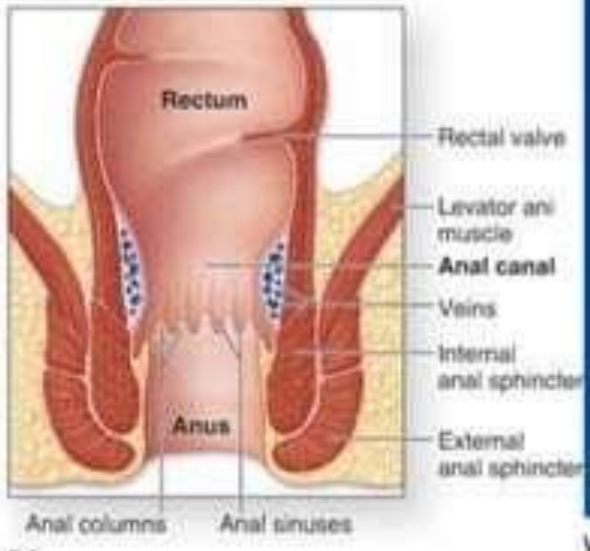
Recent anastomosis

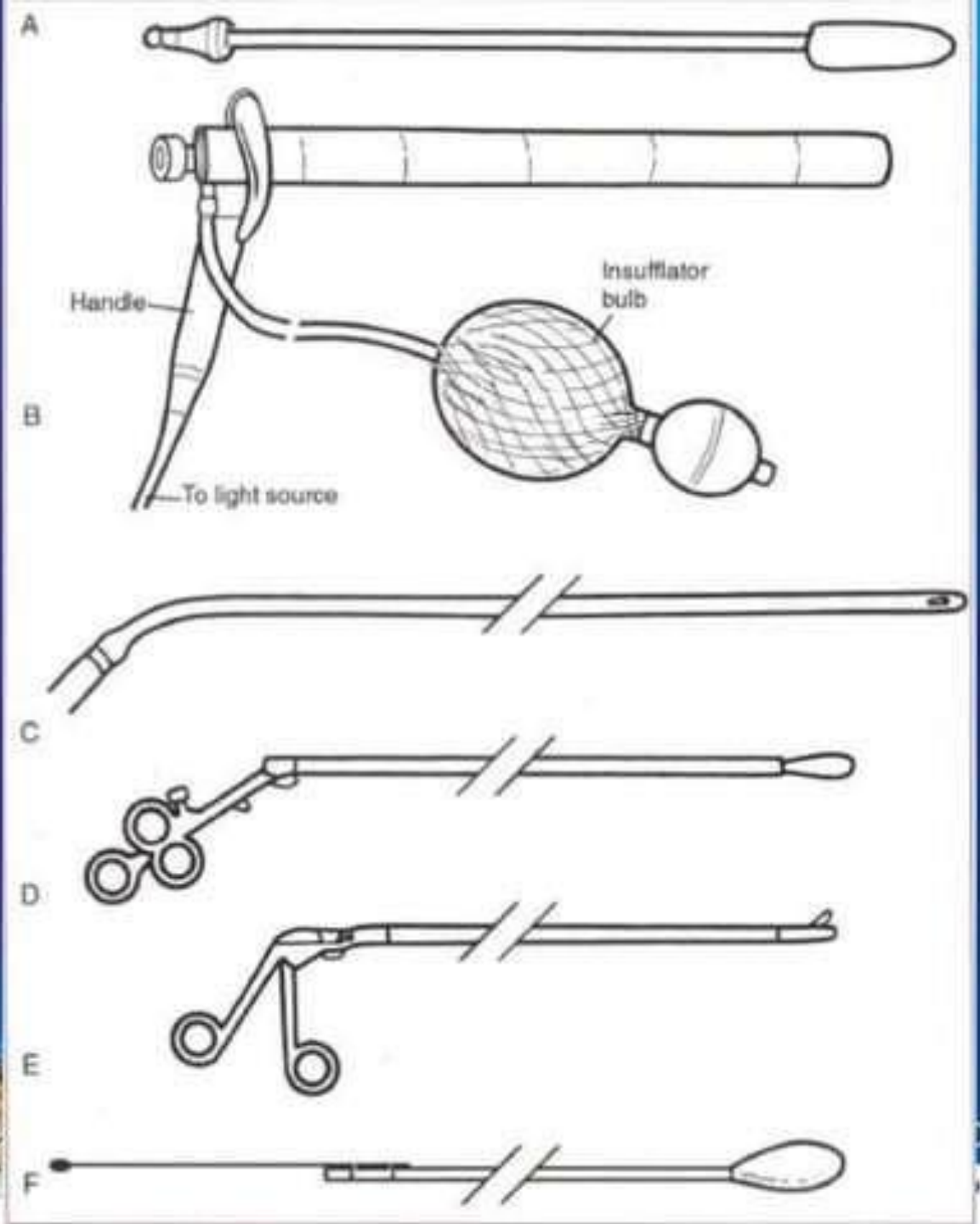
Severe stenosis of anus and rectum

Peritonitis

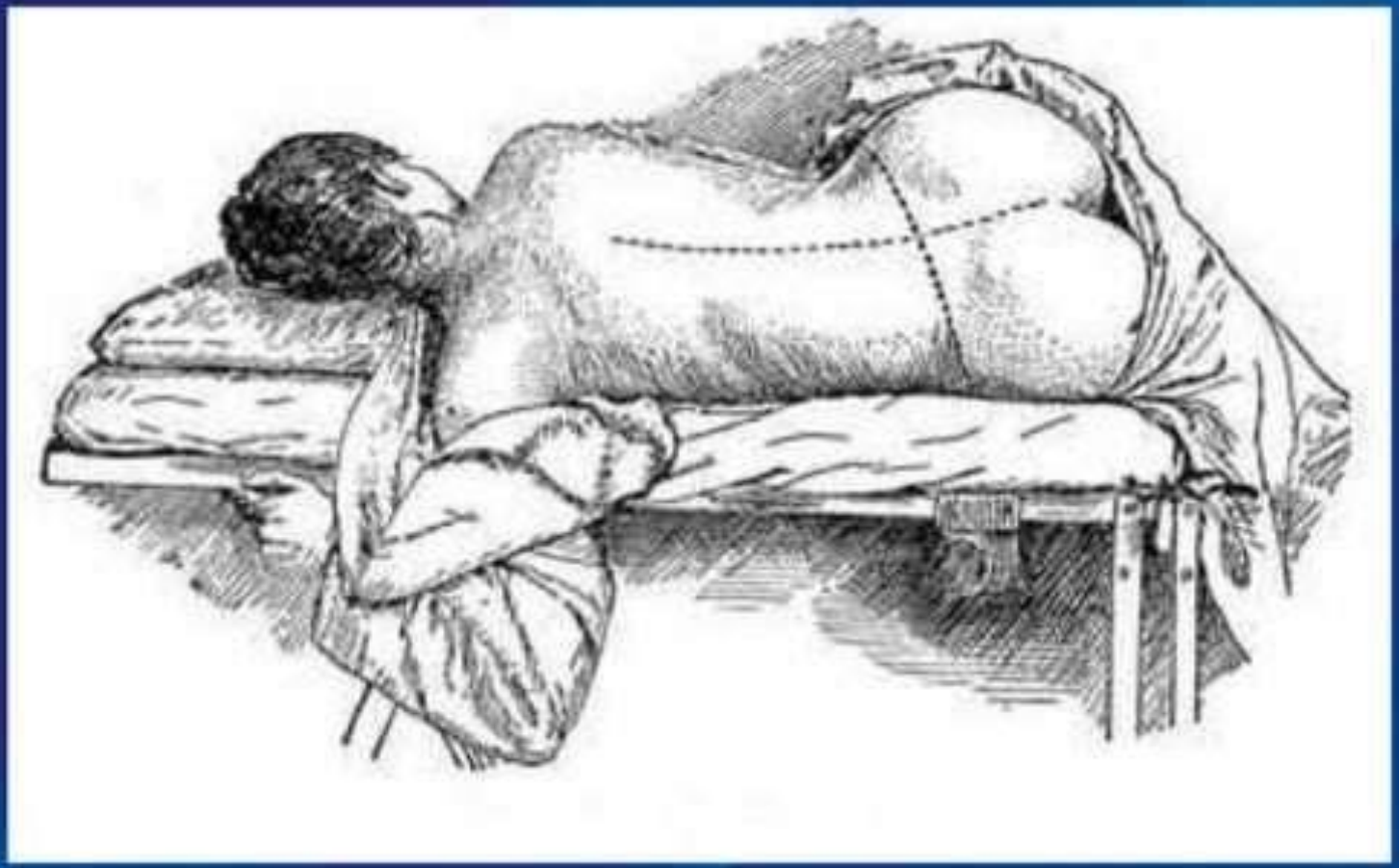




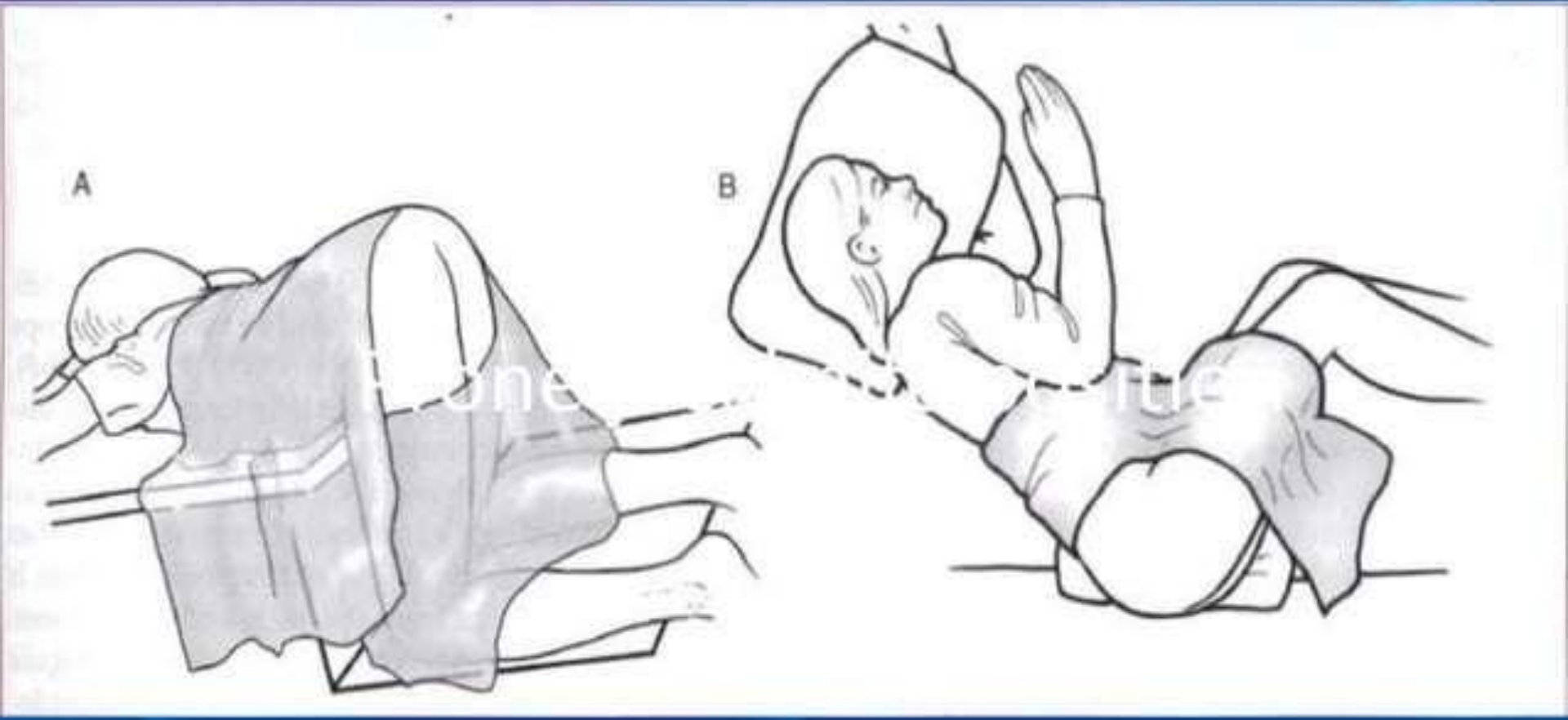



A
Handle
Insufflator bulb
B
To light source
C
D
E
F

Rigid sigmoidoscopy



Rigid sigmoidoscopy



Rigid sigmoidoscopy

Technique

Inform consent

Perineum assessment

Digital rectal examination

Insert the sigmoidoscope

Rigid sigmoidoscopy

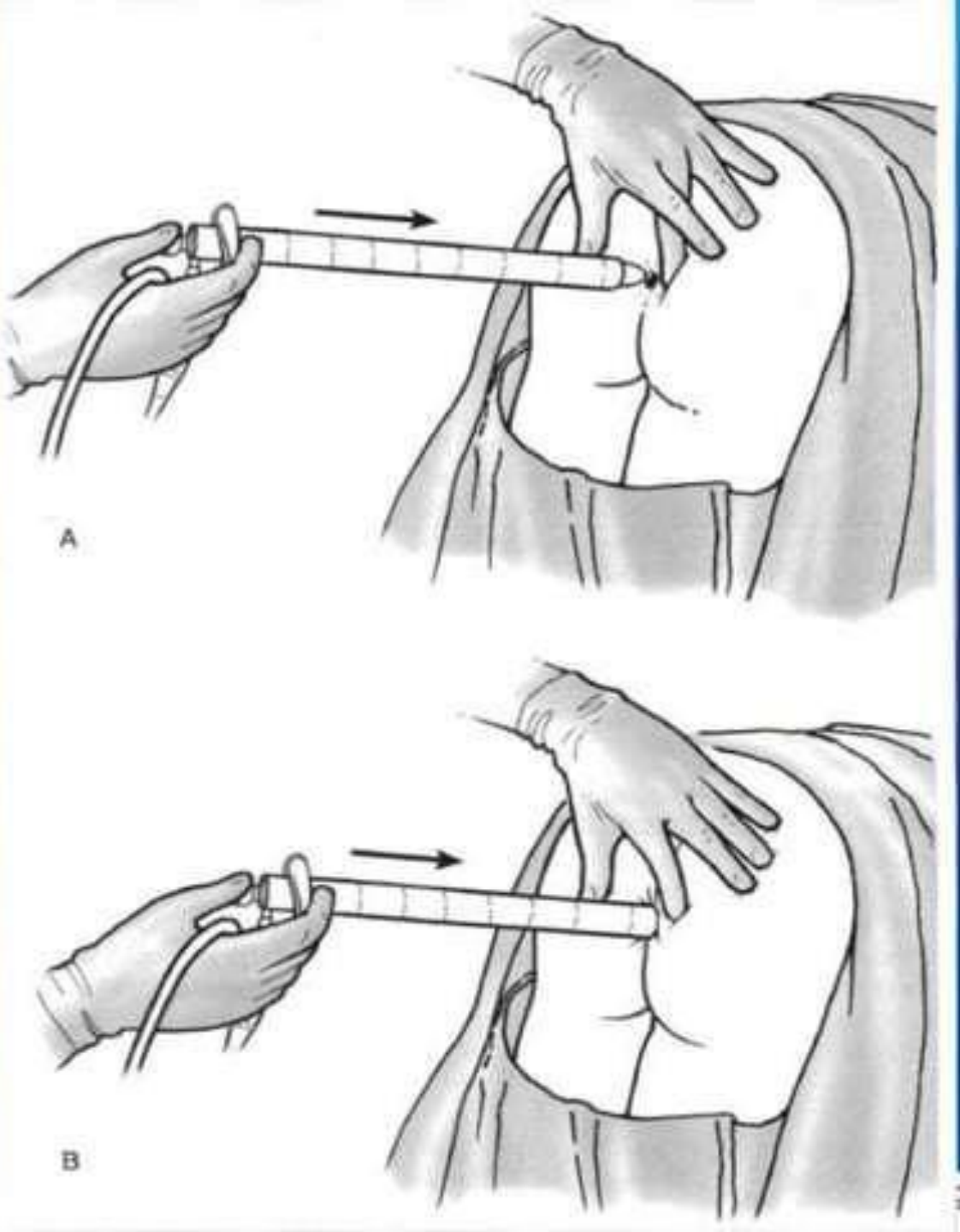
Technique

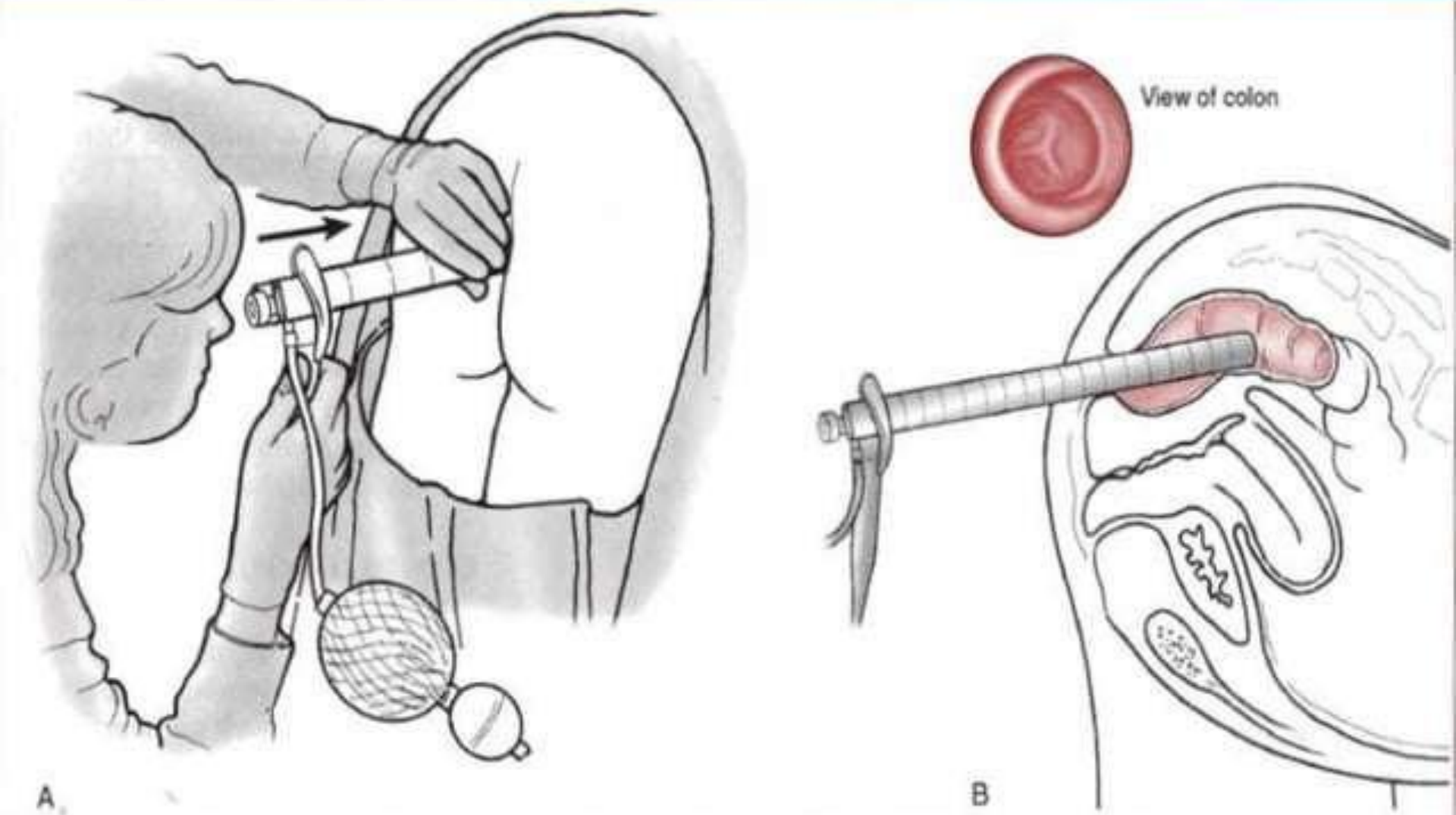
Air inflation

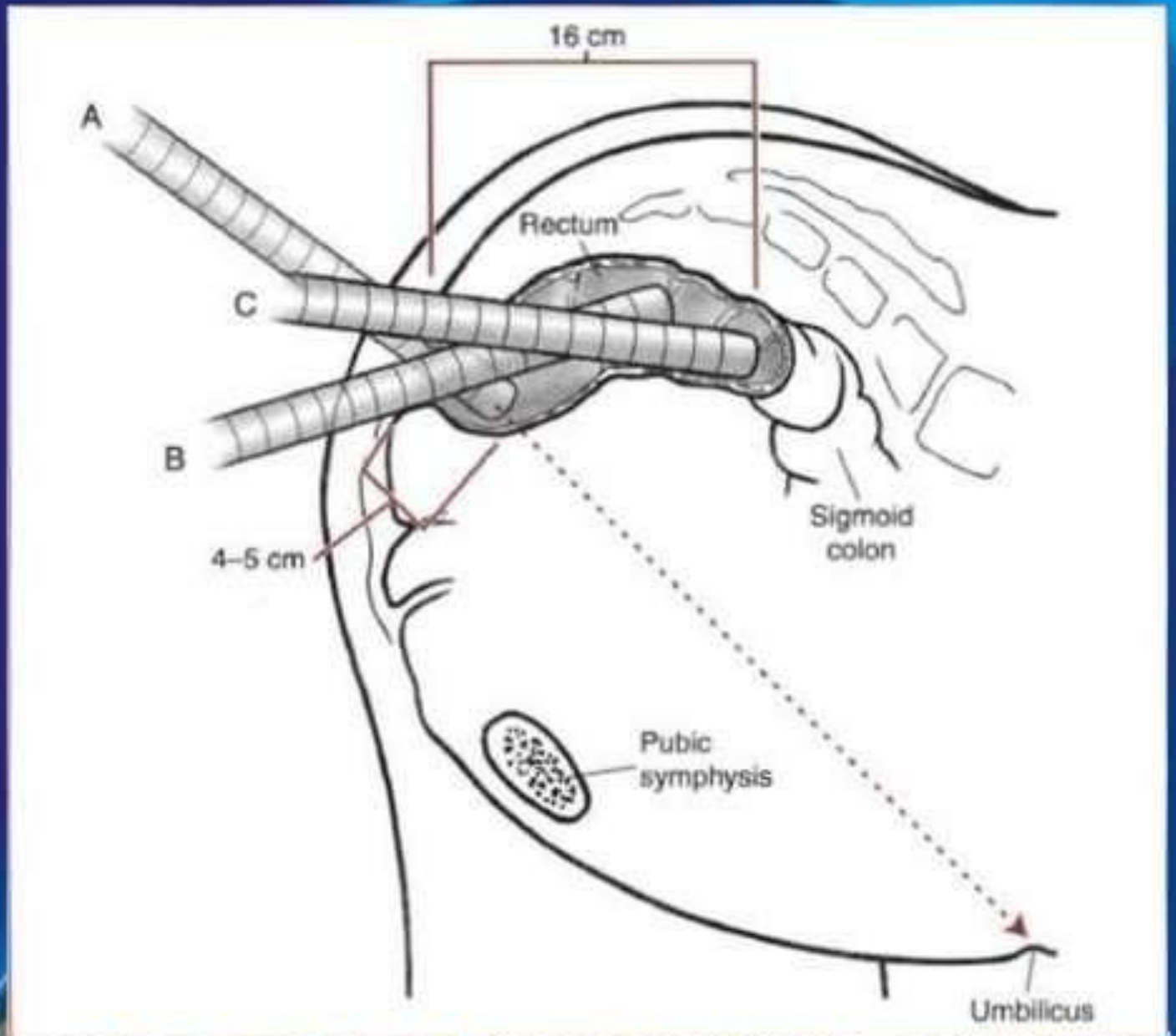
Advance gentle apply the scope

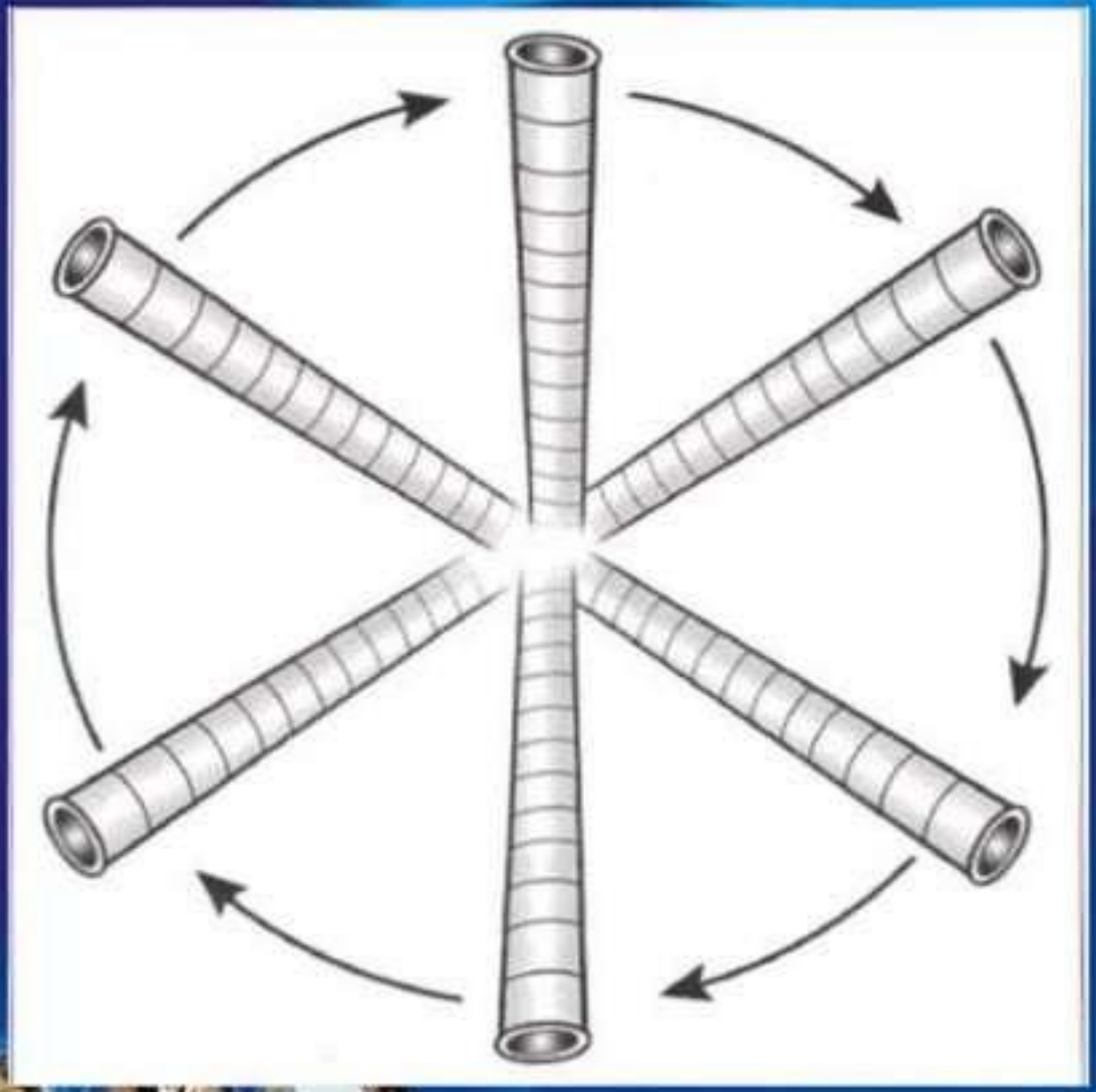
Circular movement when remove

Do not blindly apply




View of colon
A
B


16 cm
A
Rectum
C
B
Sigmoid colon
4–5 cm
Pubic symphysis
Umbilicus



Rigid sigmoidoscopy

Rigid sigmoidoscopy

Assessment

Inspect the colonic mucosa

Rigid sigmoidoscopy

Aftercare

OPD cases

Follow up

Rigid sigmoidoscopy

Complications

Perforation

Mucosal tear

Bleeding

Abdominal discomfort

Rigid sigmoidoscopy

Summary

Diagnosis and treatment method in ED

Songklanagarind Hospital
Faculty of Medicine, Prince of Songkla University

Songklanagarind Hospital

Faculty of Medicine, Prince of Songkla University

Paraphimosis reduction

Paraphimosis reduction

Iatrogrenic

Severe pain

Complications; ulcer, infection, gangrene

Paraphimosis reduction

Indications

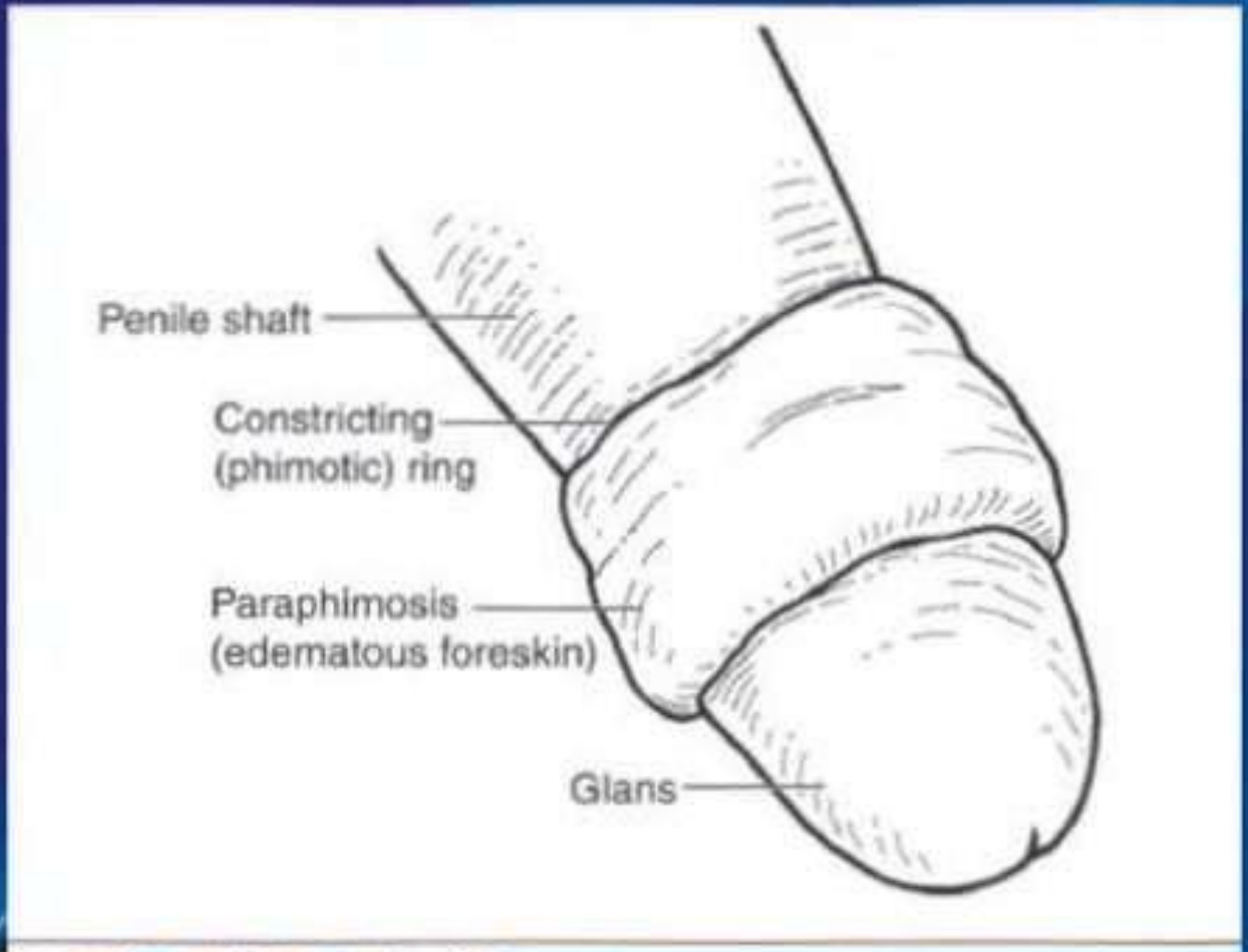
All paraphimosis

Paraphimosis reduction

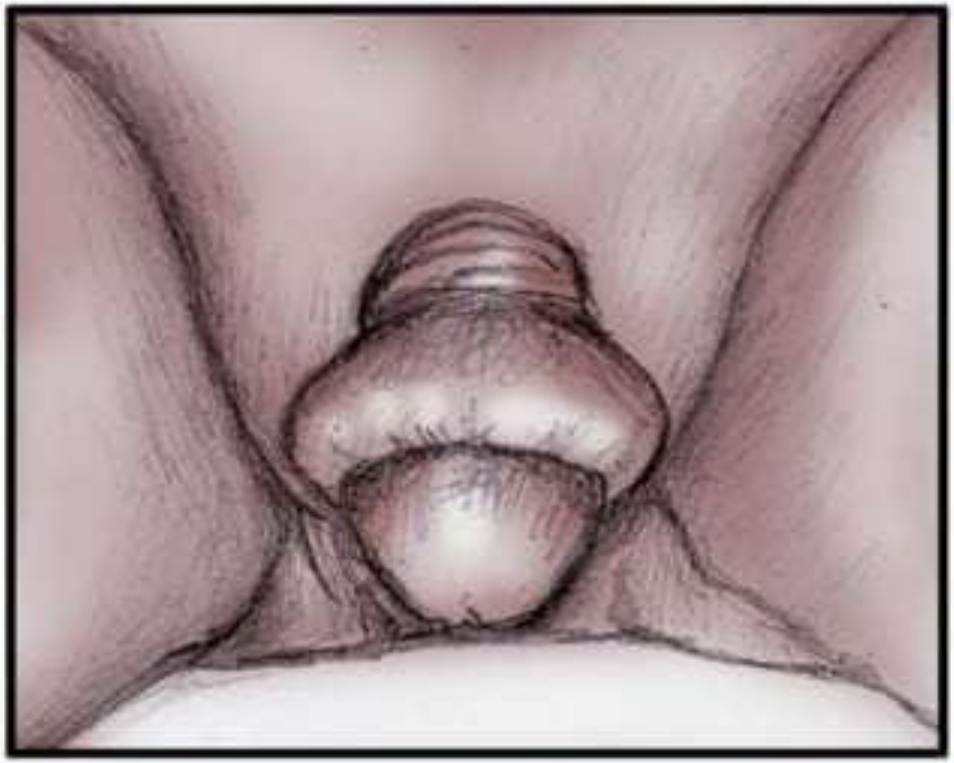
Contraindications

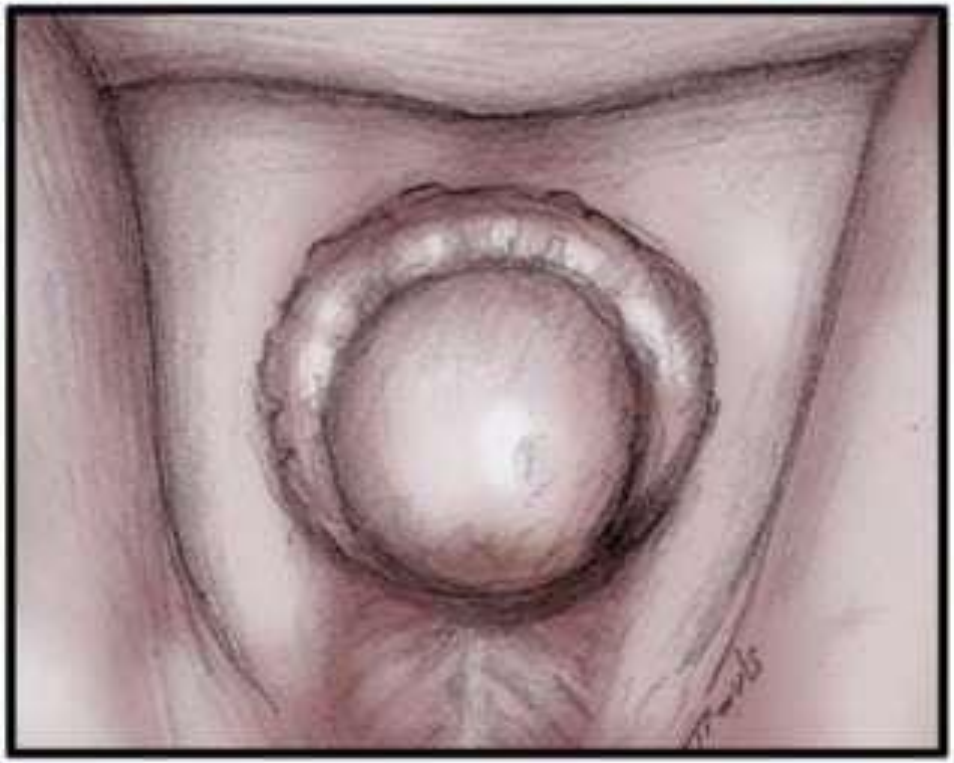
Nonsurgical; ulcer, gangrene

Paraphimosis reduction



Paraphimosis reduction





Paraphimosis reduction

Equipments

Jelly

Xylocaine

Glove

Etc. Babcock, clamp

manometer

Paraphimosis reduction

Patient preparation

Inform consent

Nonsurgical and surgical

Local +/- general anesthesia

Paraphimosis reduction

Technique

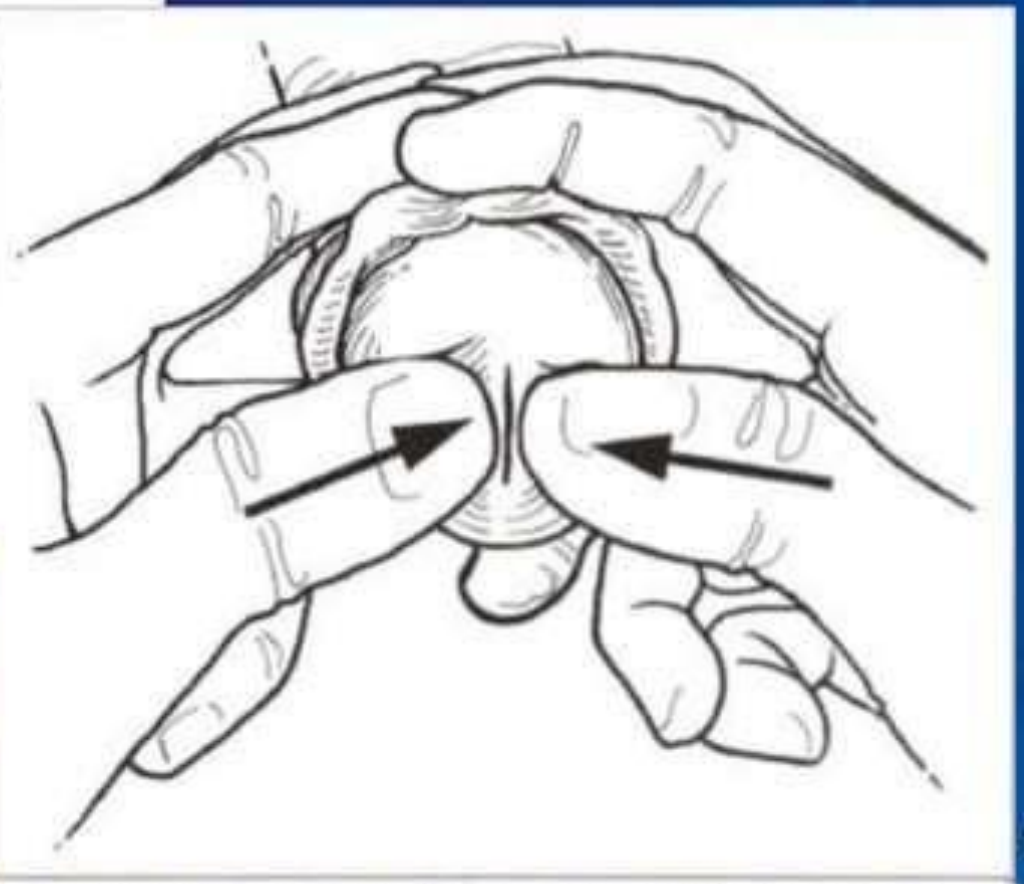
Manual reduction

Babcock clamp

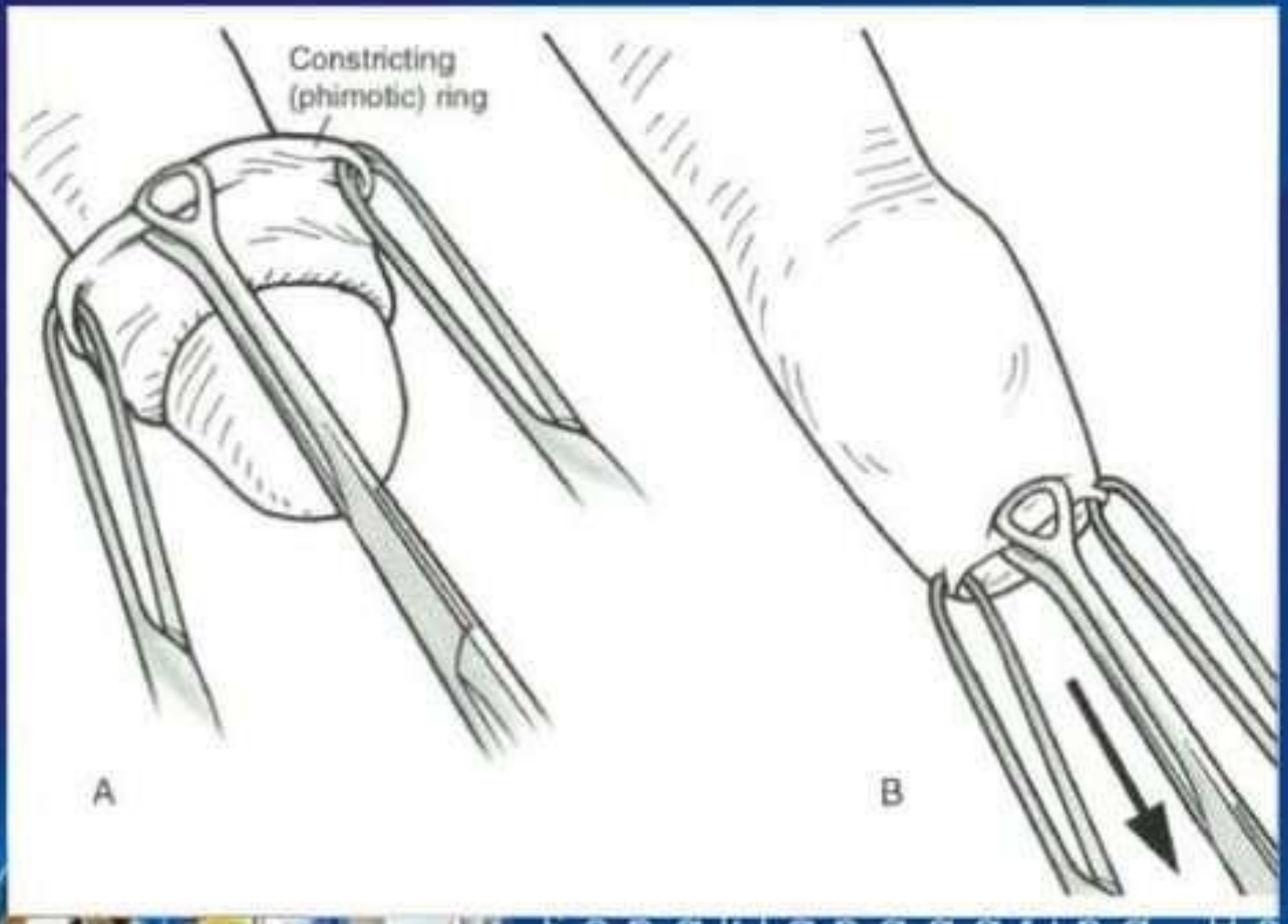
Needle decompression

Dorsal slit of foreskin

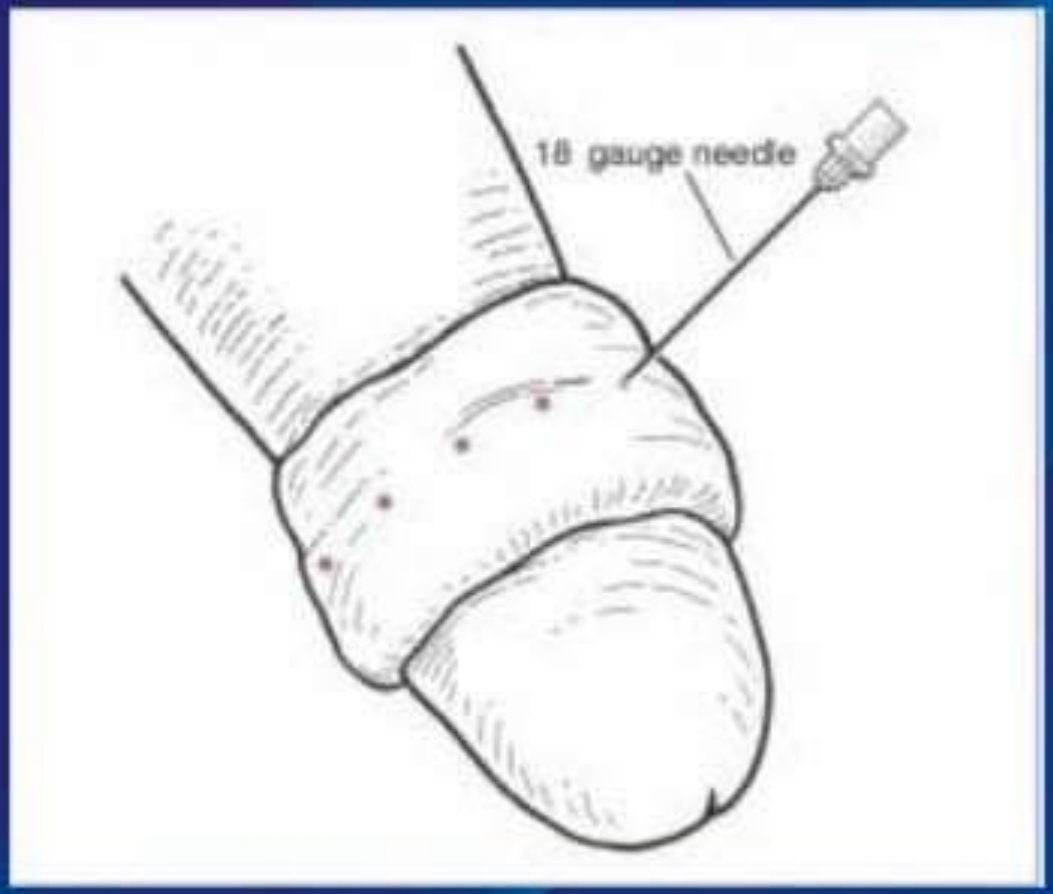
Paraphimosis reduction

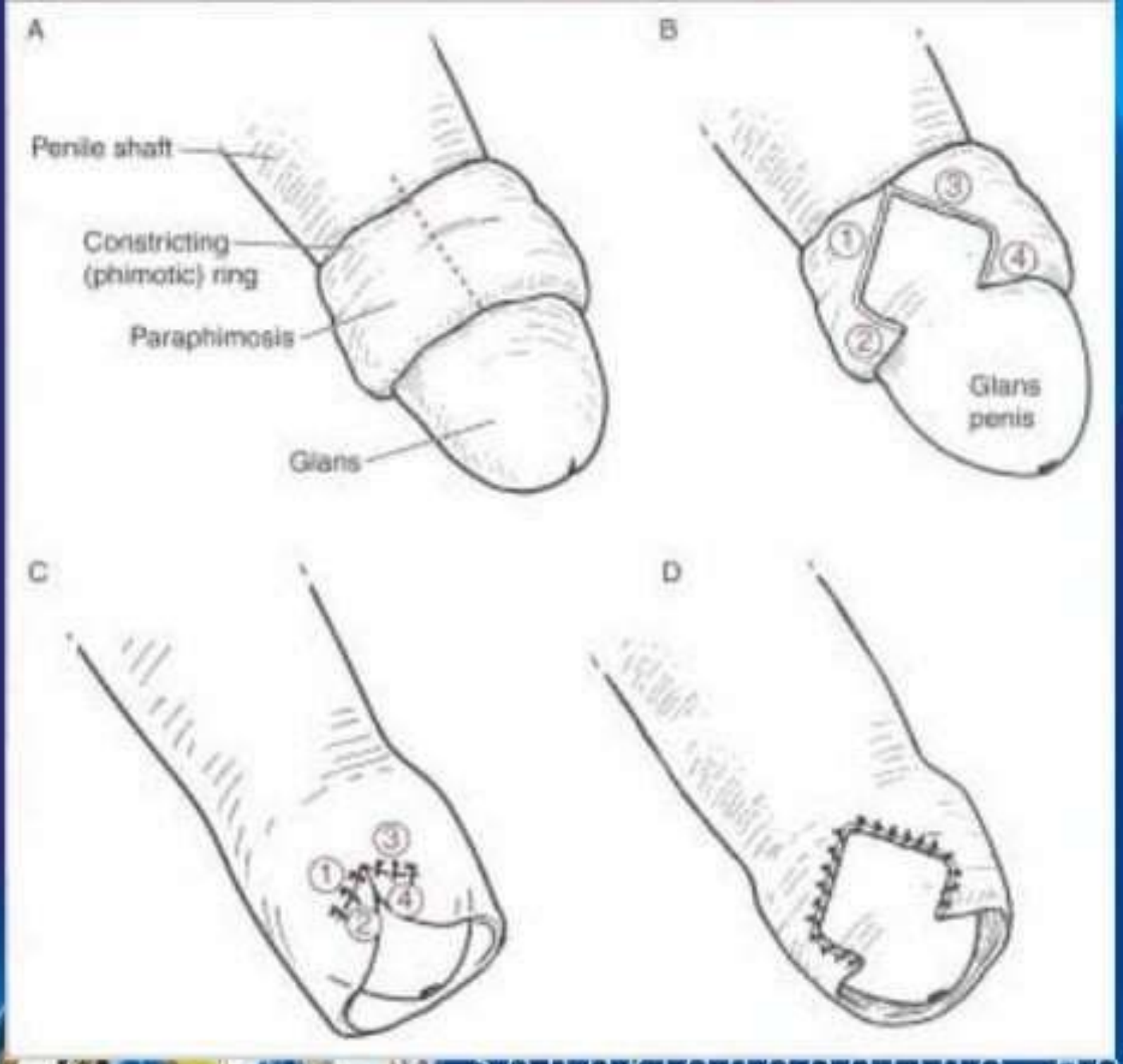


Paraphimosis reduction



Paraphimosis reduction




A
Penile shaft
Constricting (phimotic) ring
Paraphimosis
Glans
B
1
2
3
4
Glans penis
C
1
2
3
4
D

Paraphimosis reduction

Aftercare

Wound care

Avoid SI 4-6 weeks

Schedule for circumcision

Paraphimosis reduction

Complications

Incomplete reduction

Pain

Trauma

Songklanagarind Hospital

Faculty of Medicine, Prince of Songkla University

Compartment pressure measurement

Songklanagarind Hospital
Faculty of Medicine, Prince of Songkla University

Compartment pressure measurement

Common locations; leg, forearm, gluteal

Causes; crust, swelling, thrombosis

Persistent and progressive pain

Pressure > 30 mmHg consider fasciotomy

Underlying condition	Number of patients	*Percentage*
Tibial diaphyseal fracture	59	*36.0*
Soft tissue injury	38	*23.2*
Distal radial fracture	16	*9.8*
Crush syndrome	13	*7.9*
Diaphyseal fracture of the radius and/or ulna	13	*7.9*
Femoral fracture	5	*3.0*
Tibial plateau fracture	5	*3.0*
Hand fractures	4	*2.5*
Tibial pilon fractures	4	*2.5*
Foot fractures	3	*1.8*
Ankle fracture	1	*0.6*
Elbow fracture-dislocation	1	*0.6*
Pelvic fracture	1	*0.6*
Fracture of the humerus	1	*0.6*
Total	164	*100.0*

Compartment pressure measurement

Advantages

Facilitate limb salvage

Compartment pressure measurement

Disadvantages

False negative & false positive

Compartment pressure measurement

Indications

Increasing pain and muscle swelling

Absence of pulse

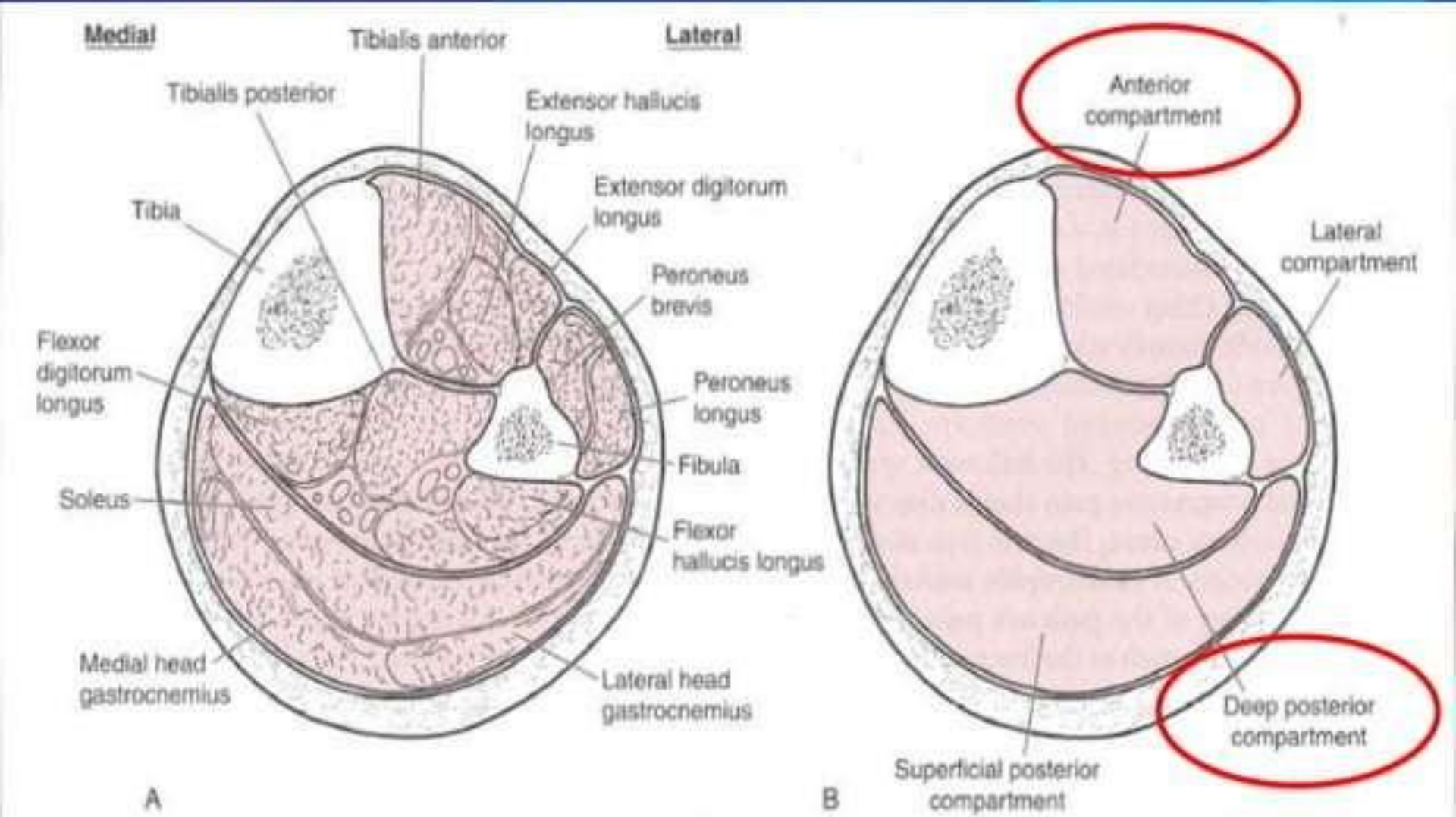
Clinical correlation

Compartment pressure measurement

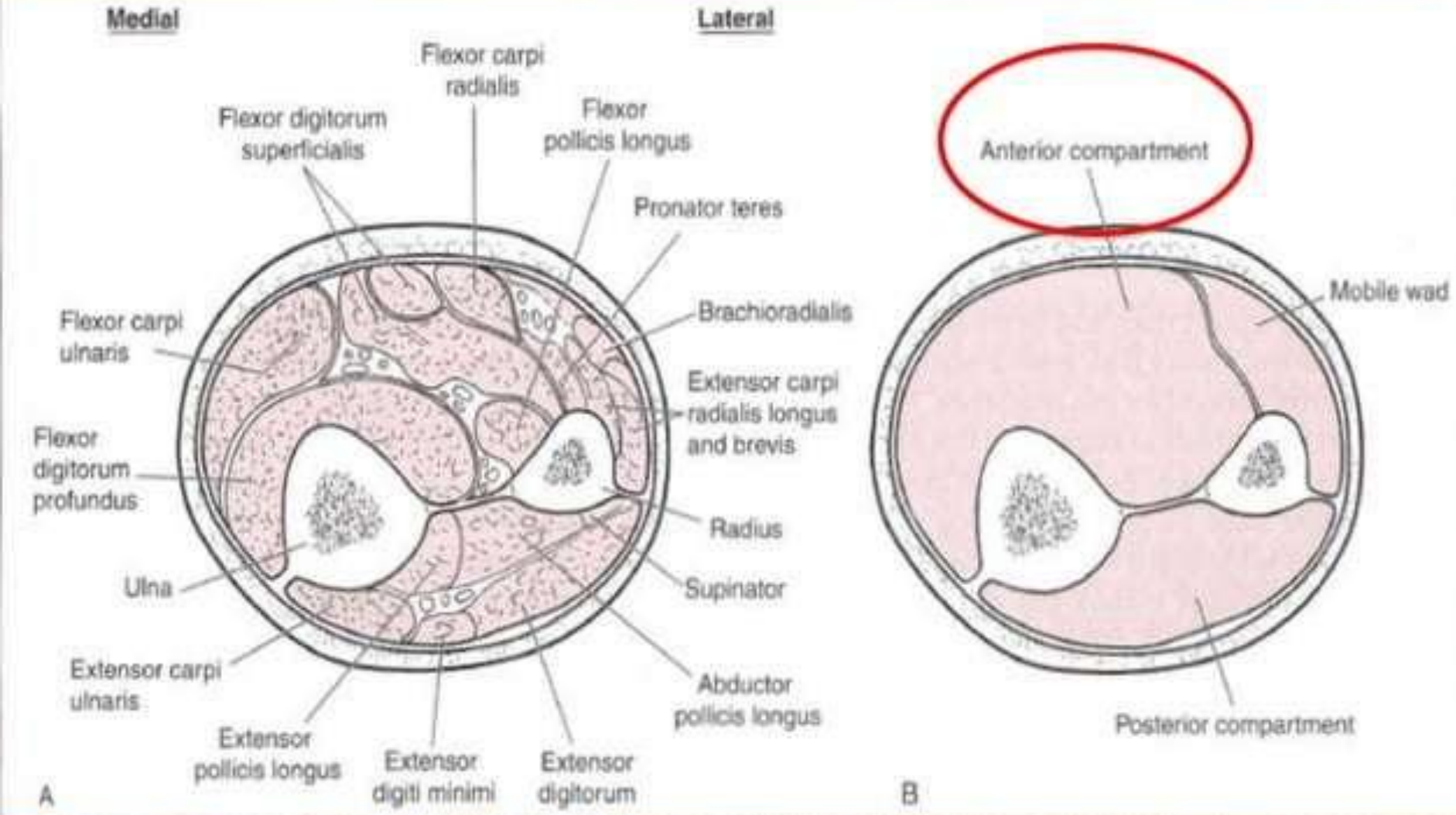
Contraindications

None

Compartment pressure measurement



Compartment pressure measurement



Compartment pressure measurement

Equipments

Intravenous extension tube

18 gauge needle

20 ml syringe

3 ways stopcock

Sterile saline

Manometer

Compartment pressure measurement

Patient preparation

Inform consent

Sterile technique

Compartment pressure measurement

Technique

Single measurement*

Continuous monitoring

*Whitesides et al. Arch Surge 1975

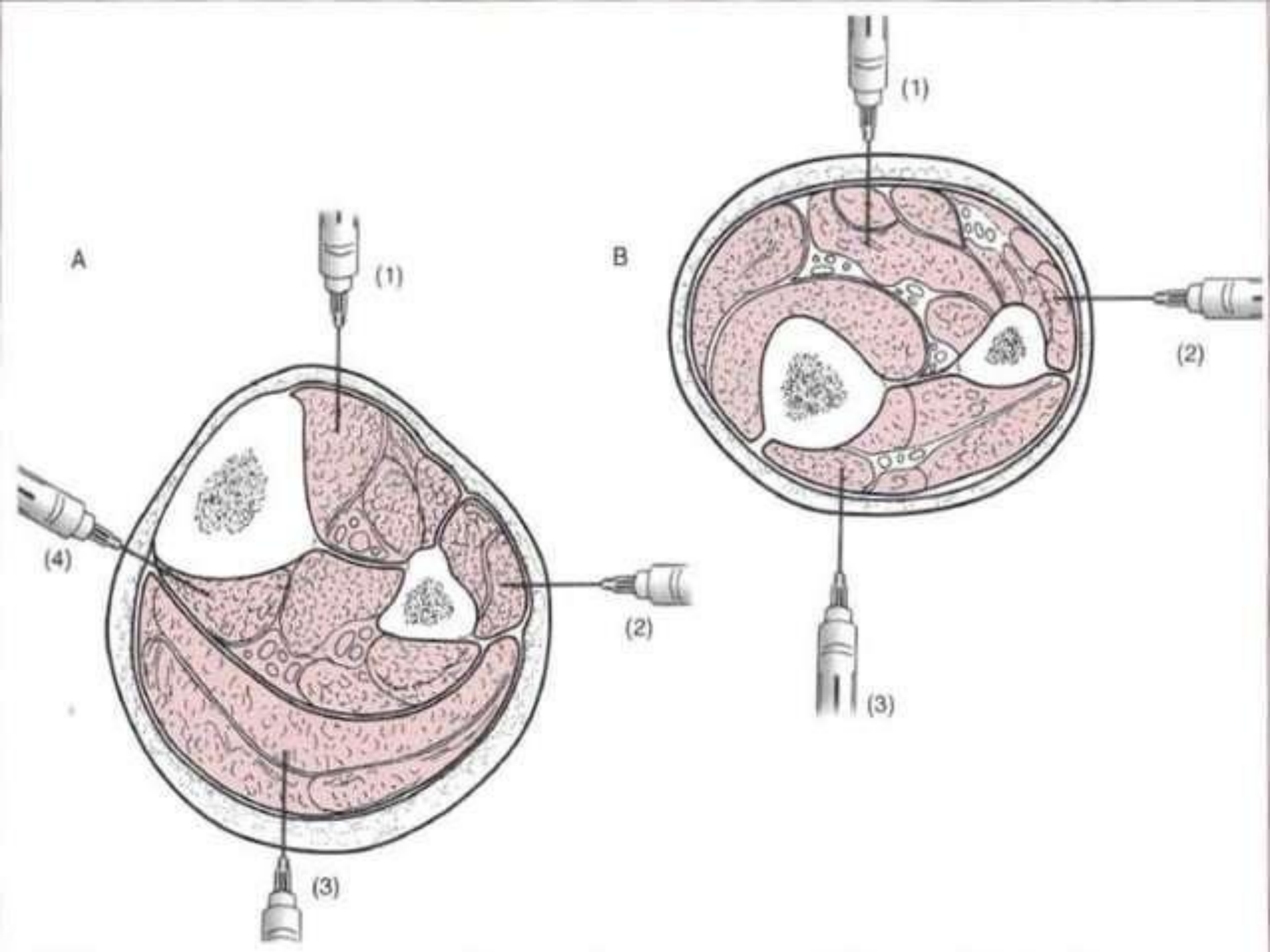
Compartment pressure measurement

Technique

No exactly location

5 cm distance proximal and distal to fracture site

Maximal tightness site

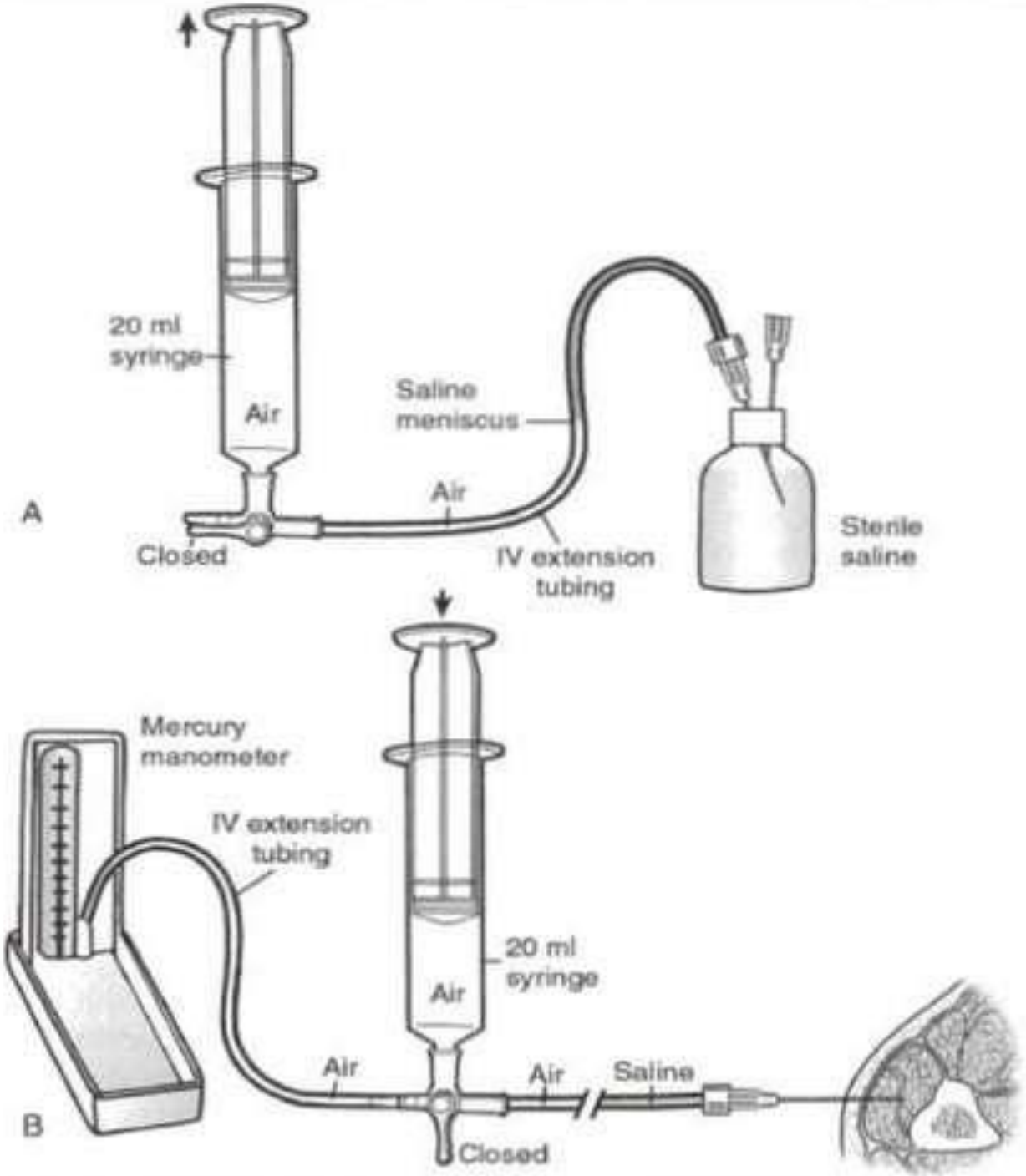

A
(1)
(2)
(3)
(4)
B
(1)
(2)
(3)

Compartment pressure measurement

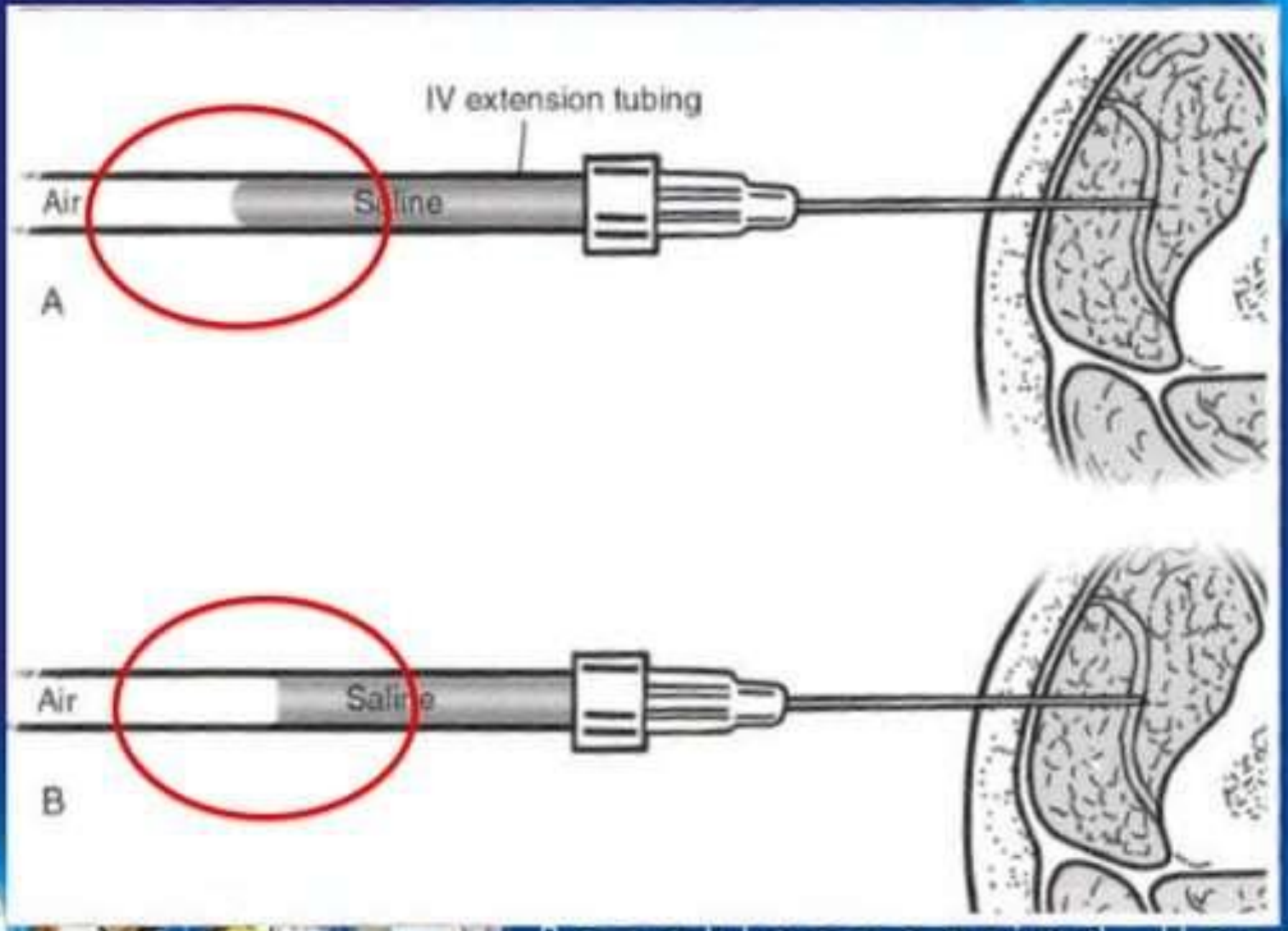
Compartment	Needle insertion site	Insertion depth (cm)
Anterior	1 cm lateral to the anterior tibial ridge and directed perpendicular to the long axis of the leg	1.0–3.0
Lateral	Just anterior to the posterior border of the fibula and directed toward the fibula	1.0–1.5
Superficial posterior	3 cm medial or lateral to a vertical line drawn through the midcalf	2.0–4.0
Deep posterior	Just posterior to the medial border of the tibia, directed posterolaterally and toward the posterior border of the fibula	2.0–4.0

Compartment pressure measurement

Compartment	Needle insertion site	Insertion depth (cm)
Anterior	1.5 cm medial to a vertical line drawn through the middle of the forearm	1.0–2.0
Mobile wad	Perpendicular to the long axis of the radius and into the muscles lateral to the radius	1.0–1.5
Posterior	1–2 cm lateral to the posterior aspect of the ulna	1.0–2.0


A
20 ml syringe
Air
Saline meniscus
Air
Closed
IV extension tubing
Sterile saline
B
Mercury manometer
IV extension tubing
20 ml syringe
Air
Air
Air
Saline
Closed

Compartment pressure measurement



Compartment pressure measurement

Aftercare

Wound dressing

Compartment pressure measurement

Complications

Infection

Neurovascular injury

False negative and false positive

Compartment pressure measurement

Summary

Essential diagnostic method

Songklanagarind Hospital

Faculty of Medicine, Prince of Songkla University

Controversial in

Surgical Emergency

13 March 2010

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Songklanagarind Hospital

Faculty of Medicine, Prince of Songkla University

Management in penetrating abdominal injury

Traumatic pneumothorax, hemothorax

Songklanagarind Hospital
Faculty of Medicine, Prince of Songkla University

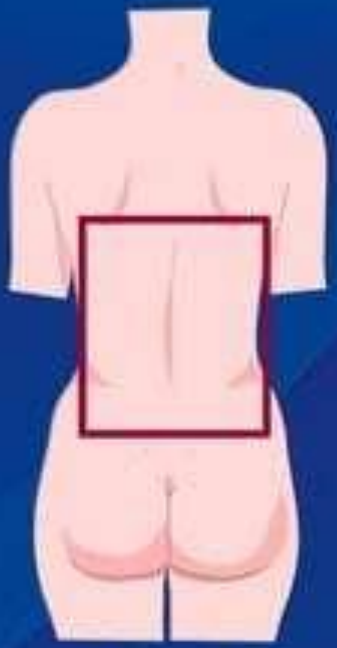
Hospital

gkla University

External Anatomy

Anterior abdomen

Flank



Back

Unrecognized intra-abdominal injury

Leading causes of preventable death

Penetrating Mechanism

- Stab
  - Low energy
  - Lacerations
- Gunshot
  - High energy

- Transfer of kinetic energy
- Cavitation
- Tumble
- Fragments

Penetrating Mechanism

Common injuries?

- **Low Energy**
  - Liver
  - Small bowel
  - Diaphragm
  - Colon
- **High Energy**
  - Small bowel
  - Colon
  - Liver
  - Vascular

Assessment

Evaluate and manage perineal, rectal, vaginal, or gluteal

Assessment: Gunshot Wound

- Tangential?
- Exit wound?
- Likely injuries?
- X-rays?
- Lab determinations?

Cause of Abdominal trauma

Penetrating

Entrance and exit wounds are important

Sometime trajectory is not straight

nd Hospital

Songkla University

Indications for celiotomy

Penetrating Trauma

- Hypotension
- Peritoneal / retroperitoneal injury
- Peritonitis
- Evisceration
- + DPL, FAST, or contrast CT

Treatment: Stab wound

Vital signs

Unstable → Opened explore lap

Stable → Local wound exploration

Treatment: Stab wound

Local wound exploration

No penetration → Observation

Penetration or equivocal → Diagnostic laparoscopy (optional triple contrast CT) (FAST)

Treatment: Stab wound

Diagnostic laparoscopy

No penetration → Observation

Extensive penetration → Opened explore lap

Management: Gunshot Wound

Early [illegible] ally is [illegible]

Operation VS Non-operative management

Operation

Pro	Con
Do not missed	Unnecessary explore-lap 25-40%
Less facility	Prolong LOS
Definite	Post-op conditions 2.5-42%

Non-Operative management

Pro	Con
Reduce unnecessary explore-lap	Delay surgery
Reduce cost, LOS	Need facility
Reduce morbid form surgery	Need team
	Close monitoring

Inaba et al. Adv Surg 2007

Non-Operative management

Nance et al. Annals of Surgery 1974

NOM in penetrating abdominal stab wound

1,180 pts, 53% negative laparotomy, 266 pts NOM (4% op)

Lower complication

Stab wound

651 patients knife wounds to anterior abdomen

345 (53%) acute abdomen sx -> immediate operation (5% unnecessary)

306 (47%) conservative management **including** patients with omental evisceration, free air, blood on paracentesis, shock on admission (this group remains a bit controversial)

11 (3.6%) required subsequent operation -> no mortality

Of 467 pts with peritoneal penetration,
27% had no intra-abdominal injury

Demetriades D, Rabinowitz B. Indications for operation in abdominal stab wounds: A prospective study of 651 patients. Ann Surg 1987, 205(2):129-32.

Stab wound

330 patients over 12 months

154 (47%) acute abdomen, underwent immediate celiotomy
Even of these, 31% negative

176 (53%) observed
3 (1.7%) injuries required celiotomy (no adverse effects)

Shorr RM, Gottlieb MM, et al. Selective management of abdominal stab wounds: Importance of the physical examiantion. Arch Surg 1988, 123(9):1141-5.

Stab wound

102 pts **without** generalized peritonitis or hemodynamic instability
51 mandatory laparotomy
51 expectant management (4 required delayed laparotomy)

Morbidity: 19% laparotomy 8% observation
Hospital stay: 5d laparotomy, 2d observation

US$2,800 saved per patient who avoided laparotomy

Leppaniemi AK, Haapiainen RK. Selective nonoperative management of abdominal stab wounds: prospective, randomized trial. World J Surg 1996, 20(8):1101-5.

Gun shot wound

111 patients with GSW to abdomen
Laparotomy decision based on physical examination alone

80% immediate laparotomy
8% negative lap

20% conservative management
None required delayed laparotomy

Muckart DJ, Abdool-Carrim AT, King B. Selective conservative management of abdominal gunshot wounds: a prospective study. Br J Surg 1990, 77(6):652-5.

Gun shot wound

146 pts with GSW to abdomen

105 (72%) acute abdomen, immediate exploration

41 (28%) equivocal or minimal exam, observed
7 (17% of observed group) required laparotomy, no added morbidity

Demetriades D, Charalambides D, et al. Gunshot wound of the abdomen: role of selective conservative management. Br J Surg 1991, 78(2):220-2.

Non-Operative management

Arch Surg 1998

DPL prediction for intra-abdominal organs injury

Prospective, 2 urban trauma center, hemodynamic stable

44 pts

DPL 91% prediction for intra-abdominal organs injury

Gun shot wound

8 year period at one trauma center
1856 patients seen with abdominal GSW
1405 anterior. 451 posterior.

792 managed nonoperatively
(34% anterior, 68% posterior).

Exclusion criteria:
peritonitis, hemodynamic instability, unreliable exam

Velmahos, Demetriades, et al. Selective Nonoperative Management in 1,856 Patients with Abdominal Gunshot Wounds. Ann Surg. 2001; 234(3):395-403.

Gun shot wound

4% progressed to delayed laparotomy
only 61% needed even this laparotomy
0.3% had complications related to delay of operation
(abscess, pneumonia, ileus)

Cost analysis:
routine laparotomy: 47% would have been unnecessary
3560 hospital days saved
$10 million saved

Velmahos, Demetriades, et al. Selective Nonoperative Management in 1,856 Patients with Abdominal Gunshot Wounds. Ann Surg. 2001; 234(3):395-403.

Gun shot wound

Laparotomies (Anterior, Posterior GSW):

Immediate laparotomy	66%	32%
Immediate negative laparotomy	12%	23%
Initial nonoperative management	34%	68%
Delayed laparotomy	5%	3%
Delayed negative laparotomy	26%	40%

Velmahos, Demetriades, et al. Selective Nonoperative Management in 1,856 Patients with Abdominal Gunshot Wounds. Ann Surg. 2001; 234(3):395-403.

Non-Operative management

Chiu et al. Journal of Trauma 2001

NOM in penetrating abdominal injury

Prospective, hemodynamic stable, triple contrast CT

75 pts, 49 pts negative CT, 47 (96%) success

CT accurate to determine the need for surgery

Non-Operative management

Demetrios et al. Annals of Surgery 2006

NOM in penetrating abdominal solid organs injury

Prospective, 20 months, level I trauma center, hemodynamic stable, CT no hollow visceral injury

152 pts, 28% NOM, laparotomy 3

High success rate and low complication

Non-Operative management

Beekly et al. Journal of Trauma 2008

NOM in penetrating fragmented wound

Retrospective, 6 months, hemodynamic stable, CT no hollow visceral injury

145 pts, 85 (59%) NOM

CT 99% prediction for success

Non-Operative management

Goodman et al. AJR 2009

Penetrating abdominal injury, hemodynamic stable

Review and Metaanalysis

Sense 94.9, Spec 95.4

Low PPV to determine the need for laparotomy

Non-Operative management

Smith et al. Ann R Coll Surge Engl 2010

Penetrating abdominal injury, hemodynamic stable

Military patients

28 pts, 13 negative CT, 12 success NOM

CT prevent unneccessary laparotomy

Non-Operative management

Como et al. J Trauma 2010

Penetrating abdominal injury

Review and meta-analysis

Not routinely laparotomy in penetrating abdominal injury

CT consider to select patient for NOM

Gun shot wound

Hemodynamically stable, No diffuse abdominal tenderness

CT then OPERATIVE vs. EXPECTANT

1/3 have no significant injuries (Demetriades, Cornwell, et al, Arch Surg, 1997)

2/3 to back have no sign. injuries (Velmahos, Demetriades, et al, Am J Surg, 1997)

CT can demonstrate trajectory, relation to vital structures,
Site and size of solid organ injury, presence of pseudoaneurysm

<5% of pts managed nonoperatively will need subsequent laparotomy

<0.5% will have any associated complications from the delay

In non-trauma centers, mandatory laparotomy still reasonable

Non-operative management

Benefit: Avoidance of Unnecessary Laparotomies

Analysis of 16 major studies, 8111 SW/GSW patients

1667 (21%) unnecessary laparotomies with 11% morbidity

(pneumonia, ileus, wound ifxn, SBO, incisional hernia)

Higher length of stay (5-10d vs 1-2d)

Much higher cost (up to $10,000 extra hosptial charges per patient)

Sequelae: Consequences of Missed Injuries

Analysis of 5 prospective studies, 728 patients

25 (3.4%) with delayed diagnosis of injuries

7 (28%) complications, no deaths

(wound ifxn, abscess, ARDS, pancreatic fistula)

Negative laparotomy

459 patients explored for stab wounds
172 (37%) negative laparotomies

147 without extra-abdominal injuries, postop morbidity 17%
Postop complications prolonged hospital stay by 4.6 days

25 with extra-abd injuries, postop morbidity 44%

Leppaniemi A, Salo J, Haapiainen R. Complications of negative laparotomy for truncal stab wounds. J Trauma 1995, 38(1):54-8.

Negative laparotomy

254 unnecessary laparotomies studied prospectively

41.3% complications:

15.7% significant atelectasis

11.0% postop HTN requiring medical treatment

9.8% pleural effusion

5.1% pneumothorax

4.3% prolonged ileus

3.9% pneumonia

3.2% wound infection

2.4% SBO

1.9% urinary infection

etc.

Renz BM, Feliciano DV. Unnecessary laparotomies for trauma: a prospective study of morbidity. J Trauma 1995, 38(3):350-6.

Negative laparotomy

1062 operations for penetrating injury, retrospective over 3 years

860 abdominal

230 (22%) nontherapeutic

8.2% complications directly related to anesthesia or operation

1 death (0.4%)

Average length of stay:

Uncomplicated nontherapeutic operation 5.1d

Nontherapeutic operation with complications 11.9d

Hasaniya N, Demetriades D, et al. Early morbidity and mortality of non-therapeutic operations for penetrating trauma. Am Surg 1994, 60(10):744-7.

Stab wound

Hemodynamically stable, No diffuse abdominal tenderness

SERIAL EXAMS

Physical exam only 3% false negative.. 94% accuracy

Better than CT, DPL, other studies

Local wound exploration useless, no longer practiced

Usually no other studies needed

Consider CT for suspected liver or renal injuries

Consider rigid sigmoidoscopy for rectal blood

Laparoscopy generally not useful, some groups doing studies

Penetrating Abdominal Trauma

Diffuse abdominal tenderness

Yes → Laparotomy

No → Hemodynamic Stability?

Algorithm
(Mattox & Moore, 2004)

Penetrating Abdominal Trauma

No diffuse abdominal tenderness
Hemodynamic stable

Yes → Left thoraco-abdominal injury?

No → Other causes of hemodynamic lability present?

Algorithm
(Mattox & Moore, 2004)

Penetrating Abdominal Trauma

No diffuse abdominal tenderness
Hemodynamic stable
Lt. thoraco-abdominal injury

Algorithm
(Mattox & Moore, 2004)

Penetrating Abdominal Trauma

No Diffuse Abdominal Tenderness
Hemodynamically Labile
Other causes of hemodynamic liability present?

Yes → DPA (Diagnostic Peritoneal Aspiration)

No → Laparotomy

Positive – Laparotomy
Negative – Continue workup elsewhere

Algorithm
(Mattox & Moore, 2004)

Songklanagarind Hospital

Faculty of Medicine, Prince of Songkla University

Traumatic occult pneumothorax

N Engl J Med 2007

Traumatic pneumothorax

Table 1. Indications for Chest-Tube Insertion.

Emergency

Pneumothorax
- In all patients on mechanical ventilation
- When pneumothorax is large
- In a clinically unstable patient
- For tension pneumothorax after needle decompression
- When pneumothorax is recurrent or persistent
- When pneumothorax is secondary to chest trauma
- When pneumothorax is iatrogenic, if large and clinically significant

Hemopneumothorax

Esophageal rupture with gastric leak into pleural space

Nonemergency

Malignant pleural effusion

Treatment with sclerosing agents or pleurodesis

Recurrent pleural effusion

Parapneumonic effusion or empyema

Chylothorax

Postoperative care (e.g., after coronary bypass, thoracotomy, or lobectomy)

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Traumatic pneumothorax

Observation/Aspiration

Risk for life-threatening condition

The Advanced Trauma Life Support

Traumatic pneumothorax

Observation in occult pneumotthorax

Include positive pressure ventilation

Depend on patients status and planned procedures

Karim Brohi. Trauma.org 2006

Traumatic pneumothorax

Observation

29.4 % without progression

Lu et al. Am J emerg Med 2008

Traumatic occult pneumothorax

Detect only by CT scan

Decrease LOS, cost, morbidity (atelectasis)

Patient comfortable

Small numbers in each papers

Table 1

Author, country, date	Patient group	Study type	Outcomes	Key results	Study weaknesses
Garramone *et al*, 1991,USA	26 trauma patients aged 14–65 with occult pneumothorax (OPTX) on abdominal CT. Classified as <5×80 mm or >=5×80 mm	Retrospective chart review	Complications of OPTX, respiratory or haemodynamic compromise	No patient had haemodynamic or respiratory complications. Of 18 with small OPTX: 2 had chest drains for increasing subcutaneous emphysema, 1 for increasing PTX. Of 13 patients with larger OPTX 4 had prophylactic chest drains, 3 for increasing subcutaneous emphysema 2 for increasing effusion	Retrospective Small numbers
Collins *et al*, 1992, USA	23 patients aged 18–82 with occult pneumothorax Immediate chest tube (n=12) vs observation (n=11)	Retrospective chart review	Length of hospital stay (mean) Length if ICU stay Complications	13.4 days vs 8.8 days 6.3 days vs 3.3 days 1 pt in immediate chest tube group: had laceration of intercostal artery. 2 observed pts had eventual chest tubes for enlarging pneumothorax or haemothorax	Small study Retrospective Not randomised
Enderson *et al* 1993 USA	40 adult trauma patients Randomized to immediate chest tube (n=19) or observation (n=21)	PRCT	Length of hospital stay Length of ICU stay Complications	12.9 vs 17.6 days 2.8 vs 3.2 days Immediate chest tube: 1 pneumonia, 8 atelectasis. Observation group 3 tension pneumothorax, 5 progression pneumothorax, 1 pneumonia, 1 empyema, 3 atelectasis	Small study
Wolfman *et al* 1998, USA	44 pts aged 17 months –70 yrs with occult pneumothorax, classified according to size into miniscule, anterior or anterolateral. Chest tube inserted dependent on size and at trauma surgeons discretion	Prospective non-randomized	Complications	15/16 with miniscule observed, 2 had delayed chest drain for pneumothorax progression. 12/20 anterior observed 1 developed tension pneumothorax. 8 with anterolateral had immediate chest drain, no complications	Small numbers Both adults and children
Brasel *et al* 1999, USA	39 adult patients with occult pneumothorax randomised to chest tube (n=18) or observation (n=21)	PRCT	Respiratory distress	1 pt with chest tube was intubated for stridor. 3 observed pts had resp distress with pneumothorax progression	Only 39 of 86 eligible pts recruited
Holmes *et al* 2000, USA	11 children <16yrs with occult pneumothorax presenting to level 1 trauma centre. 1 had chest tube, 10 observed	Prospective observational cohort study	Complications	No haemodynamic or respiratory complications	Small numbers paediatric population

Traumatic pneumothorax

Can manage with or without chest drain

Observation decreased LOS, cost, morbidity

Depend on patients condition and facility

Thank you for your attention

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Signs

Scrotum

- edema
- erythema
- size
- tender

Testis

- location / axis
- size
- tender
- consistency
- erythema

Hemothorax

Age (host.)

Pain characteristic

Sexual function

+/- Undescended testis

Peripheral inserted central line catheterization

Age (host.)

Pain characteristic

Sexual function

+/- Undescended testis

Peripheral inserted central line catheterization

Advantages

Pain characteristic

Sexual function

+/- Undescended testis

Peripheral inserted central line catheterization

Disadvantages

Pain characteristic

Sexual function

+/- Undescended testis

Peripheral inserted central line catheterization

Indications

Pain characteristic

Sexual function

+/- Undescended testis

Peripheral inserted central line catheterization

Contraindications

Pain characteristic

Sexual function

+/- Undescended testis

Peripheral inserted central line catheterization

Anatomy

Peripheral inserted central line catheterization

Equipments

Peripheral inserted central line catheterization

Patient preparation

Peripheral inserted central line catheterization

Technique

Peripheral inserted central line catheterization

Assessment

Peripheral inserted central line catheterization

Aftercare

Peripheral inserted central line catheterization

Complications

Peripheral inserted central line catheterization

Summary

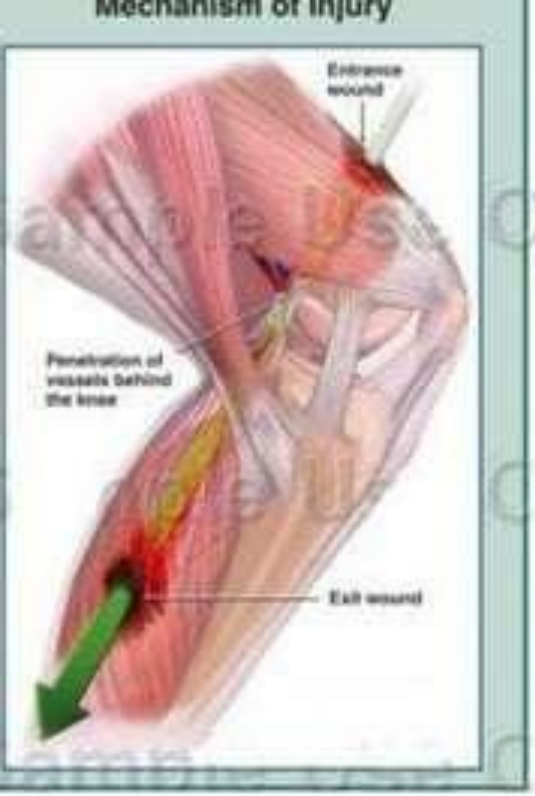
Paraphimosis management

Age (host.)

Pain characteristic

Sexual function

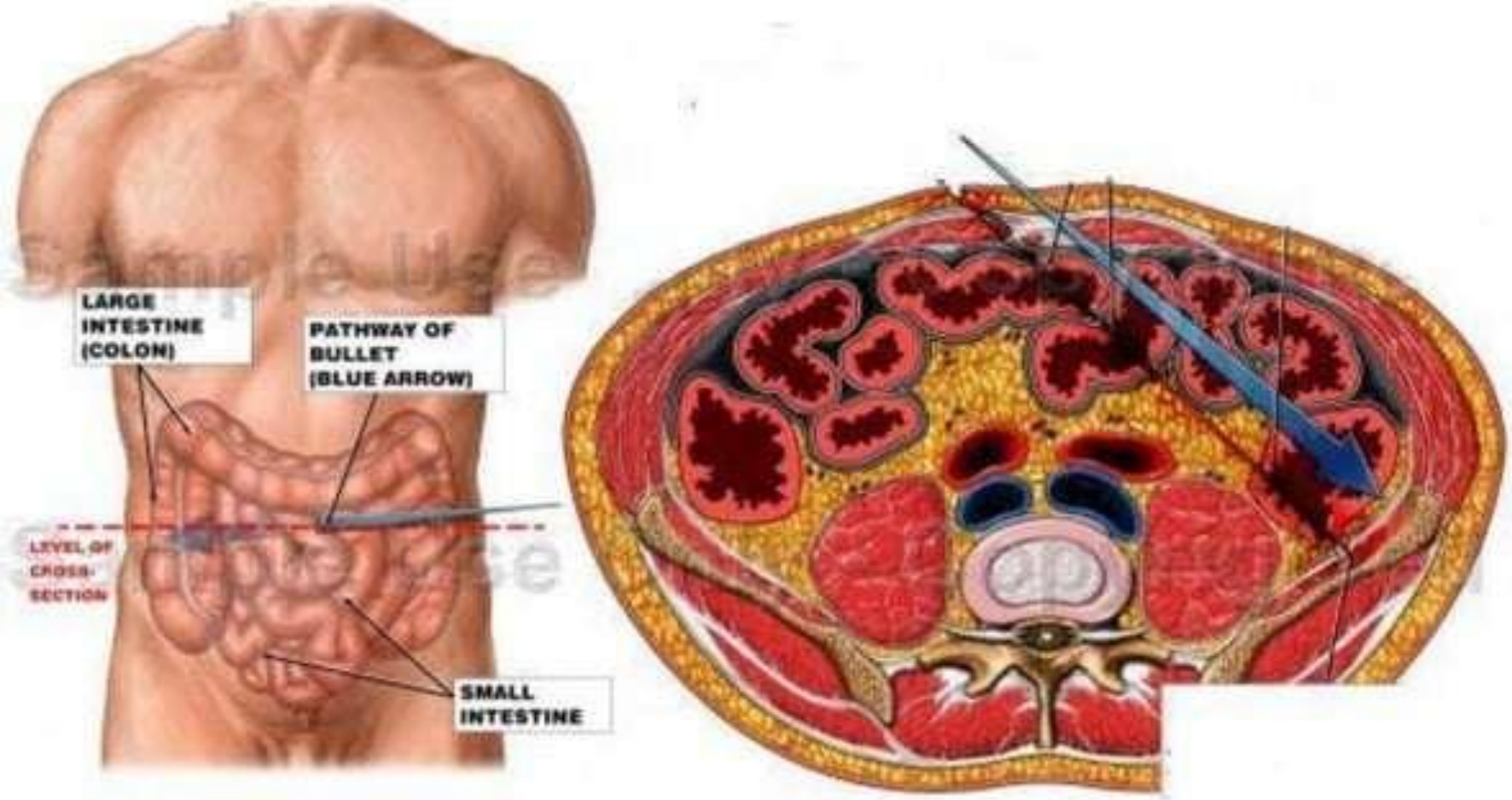
+/- Undescended testis



Open Fracture

S76.1 Injury of quadriceps muscle

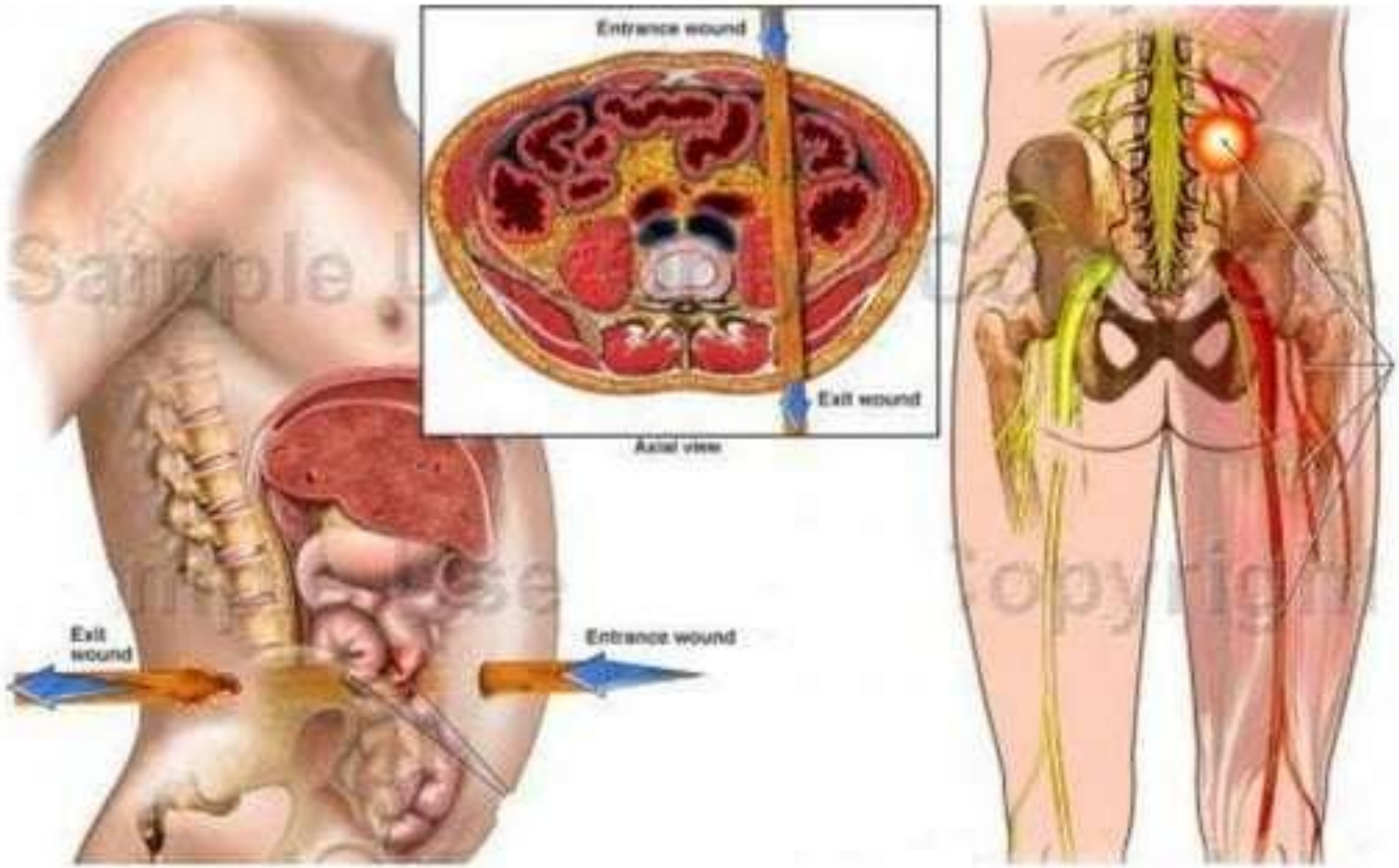
S42.31 Open fracture of shaft of humerus



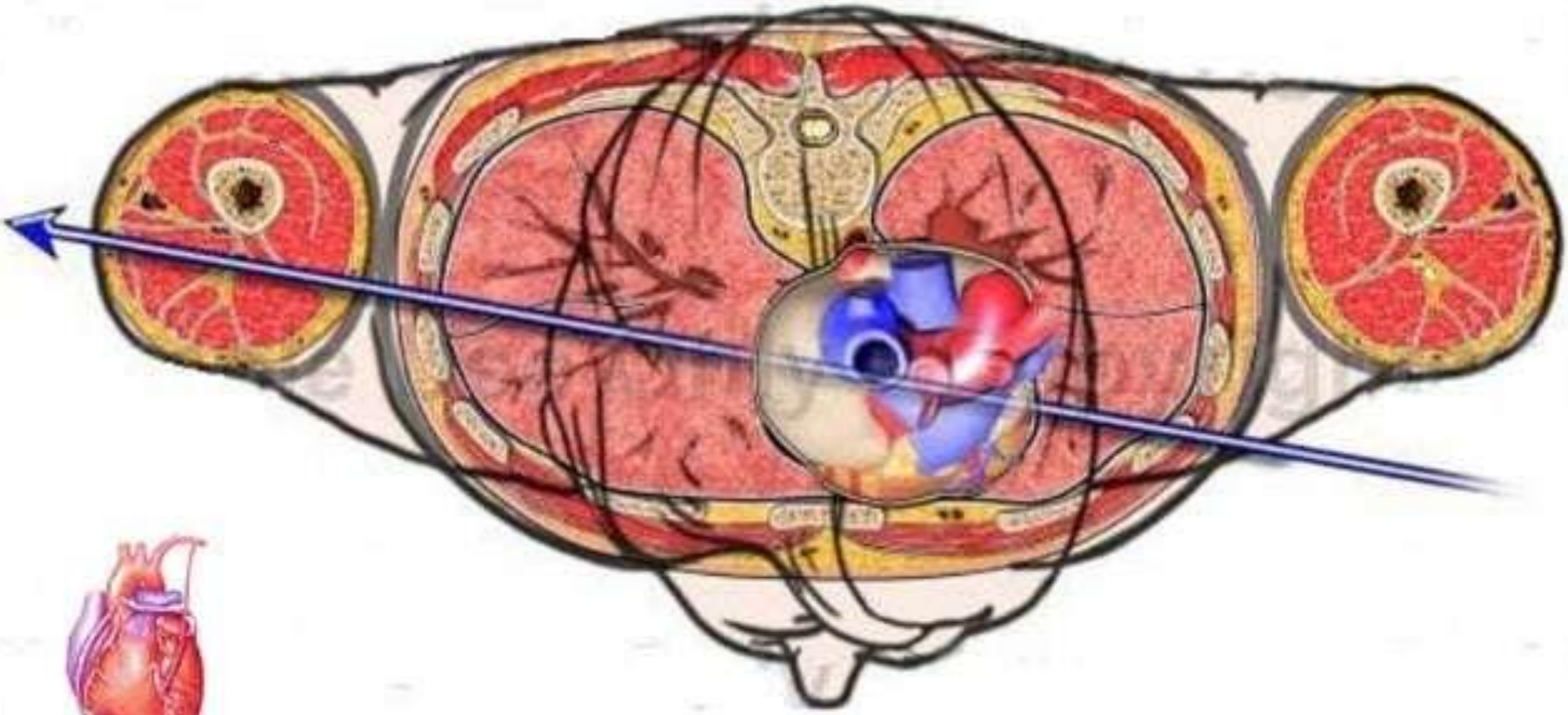
S36.41 Injury of small intestine with open wound

S36.51 Injury of colon with open wound

S36.51 Injury of colon with open wound



S34.21 Injury of nerve root of lumbar spine



S26.01 Injury of heart with haemopericardium

S27.21 Traumatic haemopneumothorax