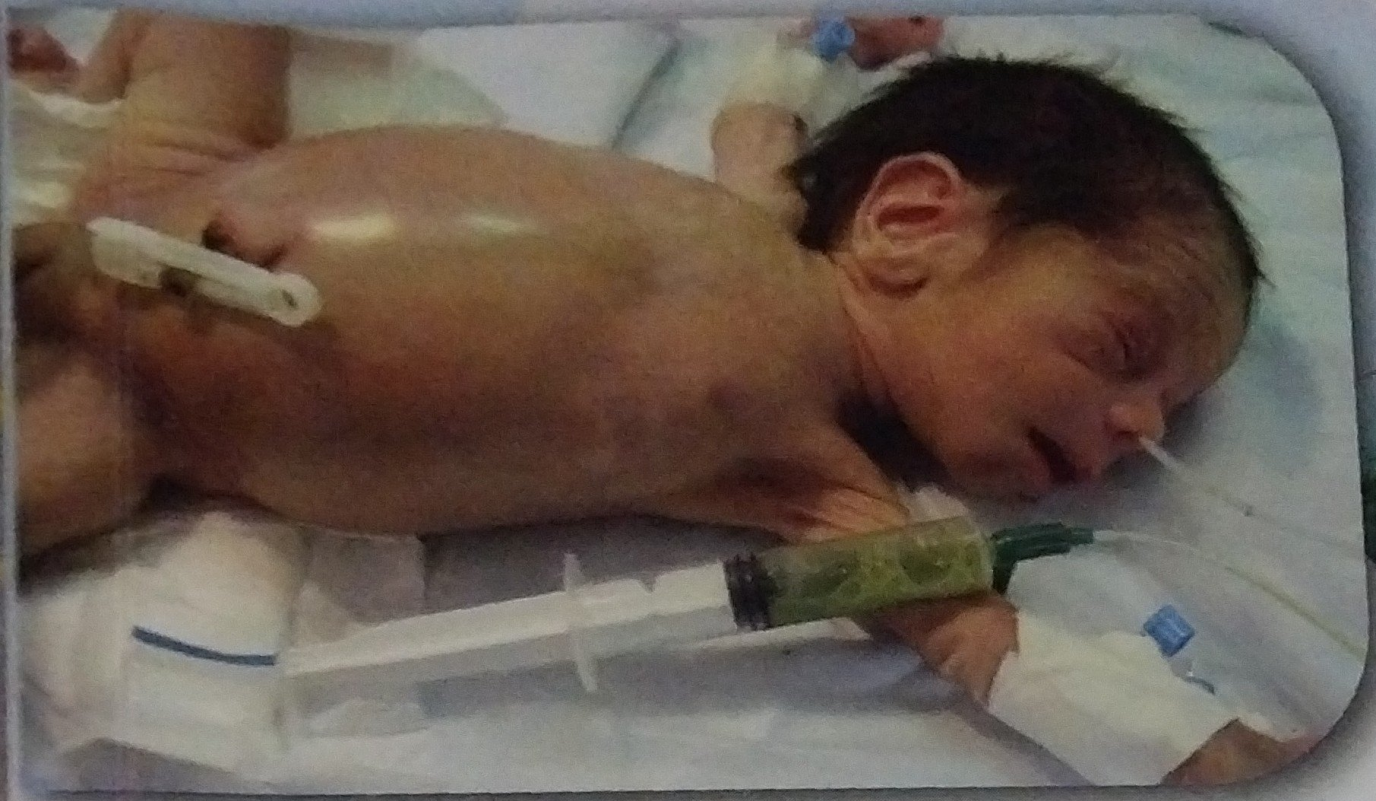
Paediatric and Neonate Surgery

GUIDE TO HOUSE SURGEON



Dr. A. Al Rawi / FRCS

Contents

Abbreviations

AP	Anterio-Posterior	mg	Milligram
A&E	Accident & Emergency	ml	Millilitre
BSA	Body Surface Area	MRI	Magnetic Rosonance Imaging
CBC	Complete blood count	NEC	Necrotizing Entrocolitis
CT	Computerized Tomography	N/g	Naso-gastric
D	Dextrose	NICU	Neonate Intensive Care Unit
D.H	Diaphragmatic Hernia	NPO	Nil by mouth
EEC	Extra-embryonic coelome	NS	Normal Saline
GU	Genito-urinary	NSAIDs	Non steroid anti-inflammatory drugs
I.V	Intravenous	OFC	Occipto-Frontal Circumference
IHPS	Infantile hypertrophic pyloric stenosis	PC	Pubo-Coccygeal
KCL	Potassium Chloride	PR	Per Rectum
Kg	Kilogram	PRO	preoperative

PO	Post operative	SIP	Superficial Inguinal Pouch
POD	Post operative day	TOF	Tracheo-esophageal fistula
RIF	Right Iliac Fossa	TPN	Total parentral nutrition
RLQ	Right Lower Quadrant	U&E	Urea and Electrolytes
S	Saline	U/S	Ultrasound
SMV	Superior mesenteric vessels		

DEDICATED TO

The Children Who Provided Me Opportunities For

Excellent Learning Experience.

PREFACE

The guide to house surgeon is just a hand book guide the reader through the realities of life as a surgical house officer, life on the wards, routine and emergency admission to guide you through the day.

It aims to provide practical guidelines for surgical house job.

Also, this hand book is intended to be use to medical students before their final.

Hopefully it will continue to offer guidance, advice and support during this transition from student to practicing doctor.

This book is drawn from our cumulative experience; I hope that will prove to be as useful and useable.

A.R

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Forward

Paediatric and Neonatology Surgery
A Guide to The House Surgeon
THINK LONG
By
Dr Abdulla Alrawi

This handbook details all the House Surgeon needs to know when in a paediatric surgical post for the first time. It is also a helpful reference book to remind more senior trainees what is required of them when working in this speciality.

The author starts the book with the Hippocratic Oath "do no harm"! and progresses to paediatric surgical history taking.

The next five chapters are about emergency situations in Casualty and a step-by-step approach how to manage these. They include the patient with a head injury and refers to the Glasgow Coma Scale. The child with burns which is very common in the middle-east and particularly important to address the area involved of the burn and the appropriate fluid regime and antibiotic therapy.The next three chapters deal with the management of severe oesophageal burns caused by caustic soda ingestion, the foreign body in the airway and in the oesophagus.

The next section of the book concerns ward routines and timetables for that particular hospital and the management of pre-natal diagnoses.There is also a chapter on pain control which is very

often poorly addressed in the paediatric ward pre and post-operatively and the administration of intravenous fluids.

The chapter on pharmacology and medication follows and then four chapters on neonatal surgery as an introduction to the sub-speciality.The management of these conditions includes oesophageal atresia, intestinal atresia, malrotation and volvulus, atresia of the duodenum and congenital diaphragmatic hernia.

Finally the last five chapters deal with routine as well as uncommon paediatric conditions such as abdominal pain and acute appendicitis, gastro-intestinal bleeding. The routine paediatric surgery which includes genital surgery such as hypospadias, circumcision, undescended testes and inguinal hernia. The last chapter is on head and neck pathology.

This book is very well referenced. We would like to mention in this forward how welcome and practical such a book would be in the hands of junior doctors, nurses and more senior staff in order to standardise the care of neonates and children with paediatric surgical problems. We whole-heartedly support this great venture. Dr Alrawi has collected important information in this book. It is well presented and illustrated and hopefully will inform carers how to look after babies and children with surgical conditions.

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Daniel D Young
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Dear Prof. Al-Rawi,

Thank you for sending me a copy of your new book to review: Paediatric and Neonate Surgery: **GUIDE TO HOUSE SURGEON**

I thoroughly enjoyed reading this highly practical approach for trainees and house officers to have the basics for caring for children with paediatric surgical disorders. This is a very handy and contemporary reference tool that could be provided in both electronic and in paper format. The book is thorough with significant depth for almost all of the most significant and common malformations and diseases that we see as paediatric surgeons. This book will also be useful for pediatricians, primary care physicians and medical students who would like additional information regarding surgical disorders.

I sincerely appreciate you sharing this with me and I have also shared this book with my colleagues here in Cincinnati.

My warmest regards and best wishes

Richard

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Hippocratic Oath

I do solemnly promise in the presence of God to be true to this declaration.
I will be loyal to the ideals of the profession of medicine and to its tradition of service to mankind.
I will follow that treatment which according to my ability and judgment I consider for the benefit of my patients, and will abstain from whatever is deleterious and mischievous.
I will give no deadly medicine to anyone if asked, nor will I perform any abortion or operation for a criminal purpose.
In the presence of epidemics or other danger I will not allow fear of personal harm to turn me from my duty.
Whatever I see or hear in the lives of men which ought not to be spoken abroad I will keep secret. Into whatsoever house I enter, it shall be for the benefit of the sick to the utmost of my power, holding myself aloof from any art of corruption.
In purity and uprightness I will pass my life and practice my art.
While I continue to keep this oath inviolated may it be granted to me to enjoy life and the practice of the art respected by men in all times.

Paediatric Surgery Service

* Our patient range in age from newborn infants through to the age of 12 years and for some children with complicated problems.
* This service provided as operation and cares for inpatients and outpatient basis.
* Day care surgery setup has been established to the best for the patient and his or her family as will as to conserve the hospital resources.
* The organization for the admission depend on the age of the child and the cares when required.
* We have patients on regular basis in the NICU and other pediatric wards.
* While the older children and the day care surgery organized regularly in the surgical wards.

Hospital Admissions

They are of two types

1- Patient from waiting list.

1- Accident cases.

Trauma

Burns

Swallowed foreign bodies

Inhaled foreign bodies.

Ingestion of corrosives.

2- Neonates emergency.

1- Obvious congenital anomalies

2- Respiratory distress.

3- Neonate intestinal obstruction.

3- Acute abdominal pain.

4- Gastro – Intestinal bleeding.

5- Acute Inguino- scrotal pain.

6- Abdominal masses.

7- neck swelling.

2- Emergency admission.

Admission work – up
" Neonates "

History

* Don`t forget Maternal / Obstetric / Fetal medicine / Labour history.
* Include Apgars / perinatal details and post – natal history to date.

Examination

* Full physical examination.
* Birth chart and admission weight.

Plan of action

* Contact Consultant as appropriate.
* Consider the need for laboratory investigation.
* Obtain I.V access if required.
* Action depend upon the working diagnosis.
* Arrange for parental consent to be obtained.

Paediatric Surgical History

Should include,

1- Mother's pregnancy: prenatal, at birth, postnatal.
Fetal development, prenatal care, birth defects, infant's development,

2- Genetic basis: careful family history, any siblings or other relatives, living or deceased affected by the same disease.

3- In children with complicated medical histories, should obtain all previous medical records.

4- Presenting Problem: Duration, Progression, Predisposition and associated symptoms.

5-General Systematic Enquiry(Review Systems) about diet, gastro-intestinal, urinary, respiratory, cardiac and neurological problems.

6- Previous medical history: serious illnesses, operations, drugs and allergy.

7- Social history

Preoperative Assessment History

Obstetric History
- Born
- Gestation
- Delivery
- Weight
- Complications
- Immunisations

Past Medical History

Previous Hospital Admission

Previous General Anesthesia

Known Anesthesia Difficulty

Known Allergies

Other Illnesses
- Asthma
- Epilepsy
- Diabetes
- Heart Disease
- Blood Disorder
- Other

EXAMINATION

Vital signs: pulse, temp.,Resp,rate ,and BP.

General features: weight, nutritional status, in pain, comfortable or ill.

- Eyes: pallor, jaundice.
- Mouth: hydration, hygiene.
- Neck: nodes, solitary or multiple

Systemic feature: always by inspection, palpation, percussion and auscultation.

Cardiovascular system

Respiratory system

Abdomen, tone, tenderness, liver, spleen, kidneys, groin and PR.

Neurological system

Specific examination: to the presenting complaint must be detailed.

PLAN OF ACTION

Differential diagnosis

Appropriate investigation

DIAGNOSIS

ACTION : Management and Treatment.

Glasgow Coma Score

Infant		Child
	Eye Opening	
Spontaneous	4	Spontaneous
To speech	3	To command
To pain	2	To pain
No response	1	No response
	Verbal Response	
Babbles	5	Oriented
Irritable Cries	4	Confused
Cries to pain	3	Inappropriate words
Moans, grunts	2	Incomprehensible sounds
No response	1	No response
	Motor Response	
Spontaneous	6	Obeys commands
Localizes pain	5	Localizes pain
Withdraws from pain	4	Withdraws from pain
Flexion (decorticate)	3	Flexion (decorticate)
Extension (decerebrate)	2	Extension (decerebrate)
None (flaccid)	1	None (flaccid)

Mild	GCS 14 – 15	Moderate	GCS 9 – 13
Severe	GCS 4 – 8	Brain death	GCS 3 & Less

Paediatric Trauma Score

Score	+2	+1	1
Patient Size	>20kg	10 – 20 kg	<10 kg
Airway	Normal	Maintainable	Invasive aid
CNS	Awake	Confused	Comatose
Systolic Bp Or pulse	>90 (Radial)	50 – 90 (Femoral)	<50 mmHg (no Pulse)
Open wounds	None	Minor	Major or Pentrating
Skeletal	None	Closed Fx	Open/or Multiple Fx

+12 = Minimal or no injury

≤8 = Critical injury.

Total _____

Important Notes For The Resident

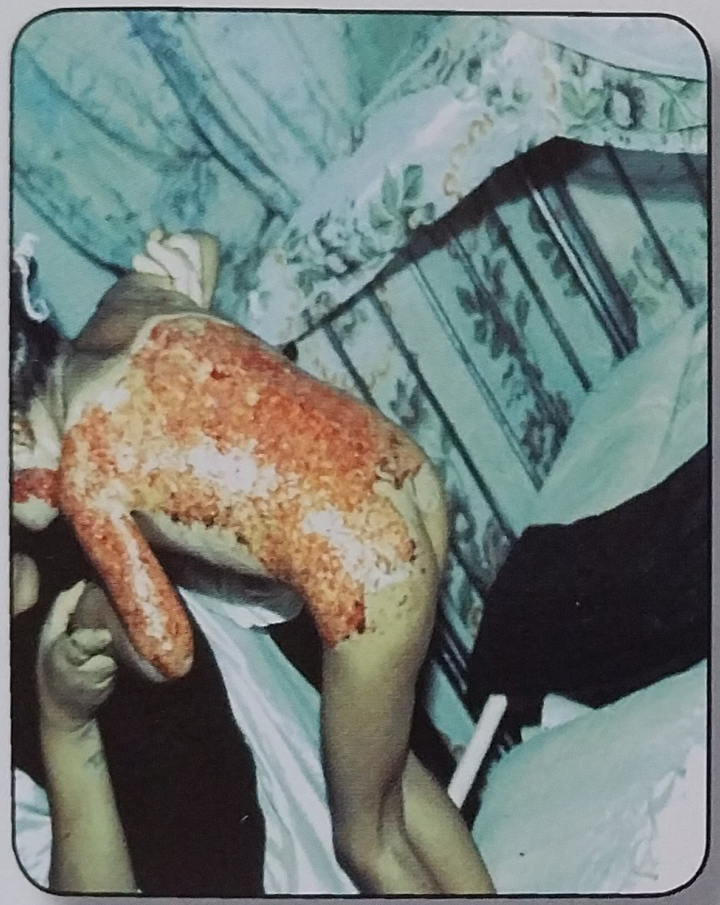
Burns in children

Indication for admission.

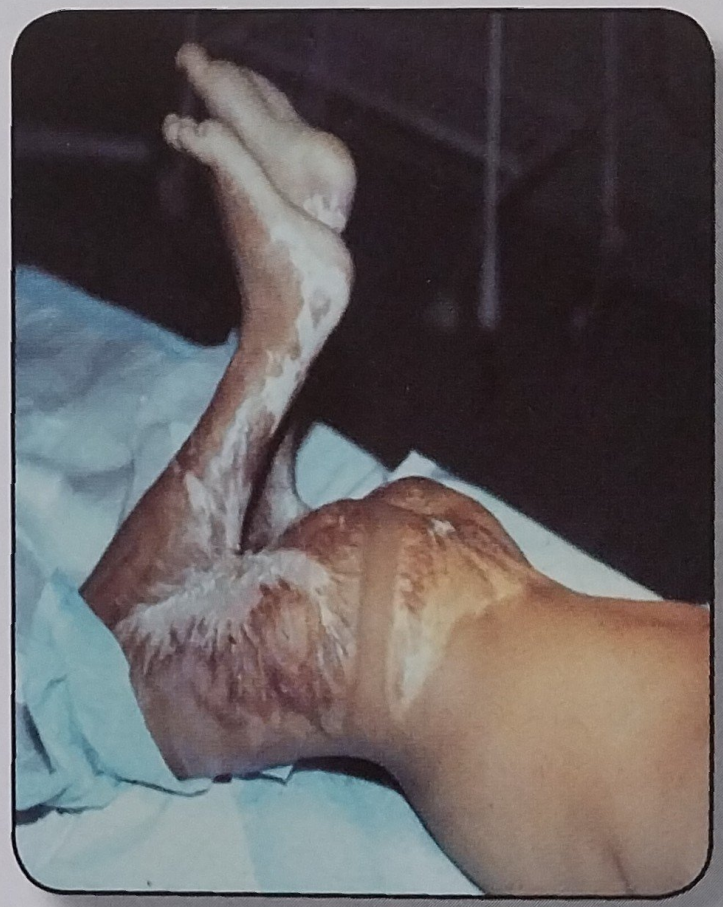
1- Partial- thickness burns greater than 10% total BSA.
2- Full- thickness burns greater than 2% total BSA.
3- Inhalation injury.
4- Significant burns of face, neck, perineum, hands and feet.
5- Circumferential burns.
6- Burns over major joints.
7- Electrical burns.
8- Chemical burns.

Action

1- An I.V infusion will be required when the burn area is greater than 10% of total body surface.
2- Calculate TBSA burn from the chart.
3- Weigh the child.
4- Choose I.V solutions (Lactated Ringer's).
5- Parkland Formula : 4cc / Kg / TBSA. (½ of the fluid to be given over the 1st. 8 hrs. another ½ of the fluid should be given over the next 16 hrs.)
6- Give tetanus toxoid.
7- I.V antibiotic.
8- Watch for urine output to assess fluid balance.



Acute burn



Contracture from neglected burn

Burns in children

Caustic Ingestions of the Esophagus

1- If ingestion of corrosive was not witnessed always assume it has occurred if lips or mouth are blistered, or drooling and unable to swallow saliva.
2- Wash off any excess corrosive material from lips and skin using plenty of water.
3- Dilute any corrosive in the mouth, esophagus or stomach by getting the child to drink cold water or milk.
4- A diagnostic esophagoscopy is necessary within 24 hrs. in every suspected cases.
5- A contrast esophagogram with water- soluble should be perform if a perforation is suspected.
6- An esophagogram usually perform 2-3 weeks after ingestion to determine the presence of stricture.

Tracheo – bronchial foreign body

1- The child has spasm of coughing.
choking and wheezing.
stridor may progress to cyanosis.
2- Decreased or absent breath sounds on affected side.
3- Chest x-ray : inspiratory and expiratory films.
10% of the F.B are radio-opaque.
4- Suspected if hyperinflation of the affected side.
or mediastinal or tracheal shift away from the side of obstruction.
5- In case of total occlusion of the bronchus results in atelectasis rather than air –trapping.
6- Once the diagnosis is suspected.
" Immediate bronchoscopy " should be arranged.

Esophageal foreign bodies

Three anatomic narrowing's of the esophagus

1- At the crico- pharyngeus level at the upper part.
2- At cross over of the aortic arch in the mid esophagus.
3- At the lower esophageal sphincter.

Symptoms : Could be:-

Dysphagea, Poor feeding, Choking, Irritability, Stridor, Cough, and drooling.

Work up

1- Chest x-ray including cervical spine and soft tissue structures. AP & lateral view.
2- Abdominal x-ray.
3- In cases of non-opaque objects, a contrast esophagogram indicated.
4- A water – soluble contrast is used if esophageal perforation is suspected.

Button batteries in the esophagus

1- Should be considered as emergency.
2- Should be removed to prevent complication

Can cause

1- Pressure necrosis.
2- Electrical burn.
3- Corrosive injury due to leakage of potassium hydroxide.

Management

1- Emergency extraction using esophagoscope.
2- Visualized for any signs of injury.
3- Esophagogram within 24 hrs.
4- Repeat the esophagogram in 30 days to rule out stricture.

Ward Routines

Typical Ward Routine for Residents

- Full history.
- Full examination.
- Organize any investigation.
- Write up drug Kardex & iv.charts.
- Arrange for consent to be obtained for any likely operations.
- The shift person must hands over to the other shift person before leaving.
- The shift person must writes in every one's case notes.
- The shift person must writes in handover book every thing that needs to be done.
- Organize the discharge forms.
- Prepare summary for each patient before the consultant ward round.
- All the investigation and the result must be ready and in order.
- Do your daily round with ward sister or with duty nurse, avoid the meal time.
- Contribute in the morning report meeting with consultant concern.
- Operation lists should be written and given to the theatre in the day before.
- Supervise the pre-operative medication and preparation.
- Contribute in the theatre activity, write down the operation notes and procedure.
- Write down the laboratory forms for any operative specimens.
- Supervise the post-operative care and medication.

Preoperative Check List

1- Examine the patient thoroughly and make sure that his condition is not a contra indication to anesthesia.
2- Explain the procedure to the family.
3- Obtain a consent for operation.
4- Make sure that there is a recent CBC.
5- Blood urea and electrolytes are requested if operations in :
   * gastro-intestinal tract.
   * urinary tract.
   * any major surgery.
   * when the patient going to stay NPO for more than 2POD.
6- The volume of blood x- matched depends on type of surgery and the size of child.
7- Chest x-ray to be arranged if any old or recent chest problems.
8- Medical consultation for any cardiac patient before surgery.

Resident Relationship

With the Patient and Relatives

* The resident doctor plays a vital role in all the aspects of the patient's illness.
* To spend the time which is necessary to explain the patient's illness.
* To explain the circumstances which will surround his operation.
* To remove any source of distress during pre and post- operative period.
* Should be friendly and helpful to the patient's relatives.
* It's important always to discover the degree of relationship.

Responsibility

* If you are worried about the patient or some unforeseen complication arises.
* Examine the patient as fully as possible.
* Inform your immediate senior.

Consultation

* The request should be made by a senior member of the unit.
* If an occasion should arise when the resident have to make the request.

1- Make sure that it is a request for opinion.
2- It should be written clearly in good English.
3-With a brief resume of the case.
4- The request for advice on a particular problem.
5-When the opinion is required urgently speak to consultant or his registrar by phone.

Management of the Deaths

* It is important that you notify your registrar and the senior member responsible as soon as possible.
* In certain circumstances a death must be reported to the coroner.
  1- The death following accident or crime.
  2- Unexpected death in a variety of circumstances.
* It is important to be familiar with the routine of coroner's reports in the hospital.

How to write the prescriptions

* Must be done in a proper manner.
* Use the approved name.
* Specify the dosage, e.g : xgm, tab, tds.
* Specify the route, e.g : oral, s.c, i.m.
* Specify the duration.

Outpatient follow-up

* Any operated patient must be seen in the outpatient clinic by surgeon in charge in 2-3 weeks after leaving hospital.
* Many patients need not be seen again after the first visit unless it's necessary.
* The patients with certain diseases will be followed up for longer periods.

Consultation Request

Patient name : patient age :

Date of Referral ----------Time ----------Room No.---------

To Dr. ----------( ) Regular ( ) Urgent

Summary for clinical presentation:

Purpose of Consultation:

Consultation Notes

Consent Form

Consent For ( ) Operation. ( ) Procedure. Date: ----------

I the undersigned---------- hereby
Consent to undergo ----------
On the patient ----------being his / her ----------
The nature effect and complications of this operation / procedure, have been explained to me. I also consent to such further or alternative measures as may be found to be necessary during the course of such operation / procedure and to the administration of local / general anesthetic for the purpose of the operation / procedure.

Doctor's Name Nurse's Name Patient's Guardian

Signature Signature Signature

Laboratory Investigation

Sources of errors

A- Sampling errors

1- Surgical spirit 70% should be used as skin preparation (Medi-swab).
2- Small amount of detergent entering the sample via the needle may result in significant haemolysis.
3- Before the blood sample is taken the tourniquet should be released because the venous congestion may lead to 10 % errors in Hct and plasma protein.
4- Forearm exercise before taking blood may lead to falsely high K+ value.
5- Blood should not be squirted through a fine needle in to the sample bottle may cause haemolysis.
6- Speed in the sample reaching the laboratory.

B- Laboratory errors

May be human or technical related to the quality of the laboratory.

Haematology & Clinical Chemistry
Request Form

Must Include

Patient name :

Patient age :

Specimen ----------

Date & time Collected ----------

Location ----------

Date & time Received ----------

In Pt. ( ). A&E ( )

Date & time Reported ----------

Out Pt.( )

Requested by ----------

Consultant ----------

Clinical Data

Summary for presentation)

Purpose of the request ----------

Laboratory Comments

Microbiology Request Form

Must Include

Patient name :

Patient age :

Specimen ----------

Date & time Collected ----------

Location ----------

Date & time Received ----------

In Pt. ( ). A&E ( )

Date & time Reported ----------

Out Pt.( )

Requested by ----------

Consultant ----------

Clinical Data

Summary for presentation

Purpose of the request ----------

Laboratory Comments

Nature of Specimen

( ) Urine (MSU, CCU, BCU)

( ) Fluid (Specify)

( ) Swab (Specify)

( ) Pus ( ) Sputum

( ) Blood ( ) Faeces

( ) Others

Radiology Request Form

Must Include

Patient name : Patient age :

Date & time Ordered ---------- Location ----------

Date & time Received ---------- In Pt. ( ). A&E ( )

Date & time Reported ---------- Out Pt.( ). ICU ( )

Diagnostic ( ) Requested by ----------

Routine ( ) Previous x- Ray ( ) Consultant ----------

Portable ( ) Any Hist. of ( ) diabetes ( ) allergies

Plain ( ) Ultra Sound ( ) CT Scan ( ) MRI ( )

Contrast ( ) Previous U/S ( ) Previous CT ( ) Previous MRI ( )

Any metallic hardware placed in the body surgically ( ) ----------

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Clinical Data

Summary for presentation.

Purpose of the request ----------

Radiology Report ----------

Histology Request Form

Important Notes

* Every operative specimen must be sent to the pathologist
* for histological examination.
* When the result is required urgently, should be under taken by special procedure.

  1- Frozen section.

  2- FNA.

  3- Print technique.

Remember:

* The request form must contain a full clinical details to inform the pathologist.

Tests for Prenatal Diagnosis

1- **Serum α- Fetoprotein.**
2- **Amniocentesis.**
   - α- Fetoprotein.
   - Chromosomes analysis.
   - Inborn errors of metabolism.
   - Rhesus Factor.
3- **Ultra Sound- Structural defects.**
4- **Fetoscopy.**
   - Structural defects.
   - Fetal blood sampling.
   - Fetal tissue sampling.
5- **Chorionic villi biopsy.**

Prenatal Diagnosis

Conditions can be detected

1- Chromosomal abnormalities.

* Down`s syndrome.
* Edward`s syndrome.
* Patau`s syndrome.

2- Neural tube defects.

* Anencephaly.
* Spina bifida
* Hydrocephalus.
* Microcephaly.
* Encephalocele.

3- Anatomical abnormalities.

* Skeletal defects..
* Abdominal wall defects.
* Brain defects.
* Bladder and Kidney defects.
* Esophageal and Intestinal atresia.
* Diaphragmatic hernia.
* Tumours.

4- Inborn errors of metabolism.

* Lipid storage disease.
* Gaucher`s disease.
* Niemann-Pick disease.
* Mucopolysaccharidosis.
* Hurler`s syndrome
* Hunter`s syndrome.
* Amino acid disorders.
* Homocystinuria.

5- Others.

* Xeroderma Pigmentosum.
* Galactosaemia.
* Congenital nephrosis.
* Thalecemia / Sickle cell disease.
* Congenital adrenal hyperplasia.
* Osteogenesis Imperfecta.
* Haemophilia.
* Von Willebrand`s disease.
* Immuno deficiency.

Paediatric Surgery

Common Terms

- Full term : between 37 and 42 completed weeks of gestation
- Postterm : one born after 42 weeks of gestation.
- Preterm : one born before 37 weeks of gestation.
- Neonate : newborn baby up to 28 days of age
- Infant : up to 1 year of age
- Child : all ages up to 14 years
- Preschool child : < 5 years
- Adolescent : puberty until 16 years.
- Prenatal death : death of the fetus after 28 weeks of pregnancy (stillbirth) or the death of a newborn in the first 7 days after birth.
- Low birth weight (LBW) infant. one whose birth weight is 2.5 kg. or less.
- Very low birth weight (VLBW) infant. one whose birth weight is 1.5 kg. or less.
- Extremely low birth weight (ELBW) infant. one whose birth weight is 1 kg. or less.

Paediatric Surgery

Common Terms

* Small for gestational age (SGA)	an infant is small for gestational age if birth weight is below the 10th. Percentile (small for dates).
* Appropriate for gestational age (AGA)	whose birth weight lies between the 10th. and 90th. percentile.
* Large for gestational age (LGA)	whose birth weight is greater than the 90th.percentile.
* Intensive care	infants who are at risk and who require life support systems. such as 1- Assisted ventilation. 2- Continuous positive air way pressure. 3- Monitoring of heart rate and respiration. 4- Monitoring of blood gases. 5- Intravenous feeding for ill infant.
* Special care	infants who are at risk and who require special observation but do not need life support systems

Intravenous Fluids

Required to :

1- Replace losses.
2- Provide maintenance.
3- Estimate ongoing losses and add.

Neonatal Fluid Requirement

* Day 1 : 60 ml./ kg / day.
* Day 2 : 80 ml./ kg / day.
* Day 3 : 100 ml. / kg / day.

After that depend on body weight

* 1 – 10 kg. Bw :100 ml./kg / day.
* 11 – 20 kg. Bw : 1000 ml + 50 ml / kg (above 10 kg) / day.
* 21 – 30 kg. Bw : 1500 ml + 20 ml / kg (above 20 kg) / day.

► 30 kg. Bw : 1700 ml + 10 ml / kg (above 30 kg) / day.

Volume Replacement

- Avoid overloading.
- In young children : use ¼ % dextrose saline.
- In bigger children : use ½ % normal saline in 5% dextrose.
- KCl : replaced as 2mmol to each 100 ml.of fluid given.
- To replace N/g aspirate use D5% 0.9NS + 10 mmol of KCl /500ml
- of fluid (volume for volume to be replaced every 8 hours over the next 8 hours and so on).
- Intestinal losses beyond the pylorus are replaced with Ringer lactate volume for volume.
- Whole blood : 12 – 20 ml / kg.
- Packed cells : 15 ml / kg. over 3 – 4 hours
- Platelets : 10 – 30 ml / kg.
- Fresh frozen plasma : 10 ml / kg.
- Cryoprecipitate : 10 – 15 ml / kg.

Pain Control

1- NSAIDs are contraindicated in children with :-

- Renal failure.
- Dehydration.
- Hypovolimia.
- Coagulopathies.
- Bleeding risks.
- Asthma.

2- Paracetamol, 40 – 50 mg / kg.

- Suppositories.
- Tablets.
- Syrup.

3- paracetamol, 20 mg / kg.

- IV, PRE. / POST., Operative / 6 hourly.
- Maximum dose of 80 mg / kg / day,
- Recommended 4 days maximum.

Pain Control

4- Diclofenac. 12.5 – 25 mg.

* Suppositories.
* Syrup.

5- Morphine.SC.

Contraindicated in :

* Hypovolemic child.
* During fluid compartment shifts.(Major surgery, Burns) Doses on demand
* Preparation : 1ml = 10 mg (morphine) + 9 ml of saline)
  = 1mg / ml.
* < 1 month : 25µg /kg = 0.025 ml / kg.
* 1-3 months :50µg /kg = 0.05 ml / kg.
* > 3 months :100µg/kg = 0.1ml / kg.

Pain Control

6- Caudal – epidural will achieve optimal pain relief.
7- Peripheral blocks (Inguinal, Penile, or Iliac)

Infusion

given post operatively after major surgery

1- Fentanyl infusion. : 1µg / kg / hour.
2- Morphine infusion : 1mg / kg to 50 ml with D5%
1 ml / hour = 20 µg / kg / hour.

Common used analgesics & sedative

1- Paracetamol : 20 mg / kg /I.V, oral or / rectal suppositories.
2- Fentanyl infusion : 1 µg / kg / hour IV. Post operative.
3- Cloral hydrate 50 mg / kg / oral. Pre operative.

Common used medications

Antibiotics

1- Amoxil : 50 – 100 mg / kg / day in divided doses.
2- Augmentin : 20 mg / kg / dose 12 hourly orally.
: 30 mg / kg / dose every 8 – 12 hours. IV.
3- Cefotaxime : 50 mg / kg / dose IV slow infusion.
4- Cefoxitin : 25 – 33 mg / kg / per dose IV slow infusion.
5- Ceftriaxone : 50 mg / kg / Q, IV / 24 hours.
6- Erythromycin : 12.5 mg / kg / dose Q 6 hours.
: 5 -10 mg / kg / dose IV, Q 6 hours.
7- Septrin Suspension : 6 wks – 6 m, 2.5 ml bd.
: 6 m – 6 yrs, 5 ml bd.
: over 6 yrs, 10 ml bd.
8- Flagyl : 7 – 8mg / kg / dose, 8 hourly.
9- Amikacin : 7 mg / kg / dose, Q 12 hourly.
10- Gentamycin : 2 mg / kg /dose, 8 hourly.
11- Neomycin : 50 mg / kg / day orally.

Commonly used medications

Cont....

12- Ranitidine : 2 mg / kg / dose, oral
: 0.5 mg / kg / dose IV Q6 hourly slow push.

13- Cimitidine : 2.5 – 5 mg / kg /doseQ 6 – 12 hourly, oral or IV.

14- Omperazole : 0.5 mg / kg / dose / oral, once a day.

Bowel Preparation Before Colonic Surgery

1- Keep patient NPO for 24 hours before surgery
2- IV crystalloid infusion according the weight for 24 hrs.pre.op.
3- Pass N/G tube and give Kolyte solution 30 – 40 ml / kg.
   * Give it over a couple of hours.
   * Repeat till fluid comes clear through.
   * Do not exceed 100 ml / kg.
4- Colonic wash twice daily for 3 days before surgery.
   * Warm normal saline 30 – 50 ml for each time.
   * Neomycin added to the wash (1gm for each 1000 ml,N/saline.
5- Oral neomycin 50 mg / kg / day for 3 days before operation.
6- IV antibiotic to be given just before surgery with premedication.
   * Augmentin 40 mg / kg. + Flagyl 7 – 8 mg / kg.
     Or
   * Rocephine (3rd. Generation cephslosporin) + Flagyl.

NEONATE SURGERY

The Incidence & the outcome Depending on :

- Birth Rate
- Antenatal Diagnosis
- Neonatal Care : depend on :
  - Early diagnosis
  - Early transport
  - Effective surgical center : depending on :
    - Skills
    - Equipment
    - Nursing

Types of Cases

Class 1 : Infants who are likely to be completely cured by surgery.

Class 2 : Infants who, after treatment, will be handicapped to some extent but may still be able to lead a relatively normal life.

Class 3 : Infants who, after treatment, will have severe physical handicaps and will have to lead a more or less sheltered life.

Class 4 : Infants in classes 1 to 3 who, in addition, are of subnormal intelligence but can, up to a point, be trained.

Class 5 : Infants in classes 1 to 3 who, in addition, are mentally defective children, leading a " vegetable " existence.

Incidence of congenital malformation in live-born infants

* Congenital diaphragmatic hernia	1/ 3000
* Oesophageal atresia/ TOF	1/ 7500
* Gastroschisis	1/3500
* Hirschsprung's disease	1/ 5000
* Duodenal atresia	1/ 10 000
* Anorectal malformations	1/ 5000
* Biliary atresia	1/ 16 000
* Hypospadias	1/ 300
* PUJ obstruction	1/ 1000
* Hydrocephalus	1/6000
* Cleft lip/ palate	1/ 750

NEONATE SURGERY
Newborn with developmental anomalies

Obvious anomalies

* Polydactyly
* Exomphalos
* Gastroschisis
* Myelomeningocele
* Encephalocele
* Ectopic vesica
* Cleft palate and lips
* Imperforate anus

Important Notes For The Resident

Anterior Abdominal Wall Defects (Gastroschisis & Exomphalos)

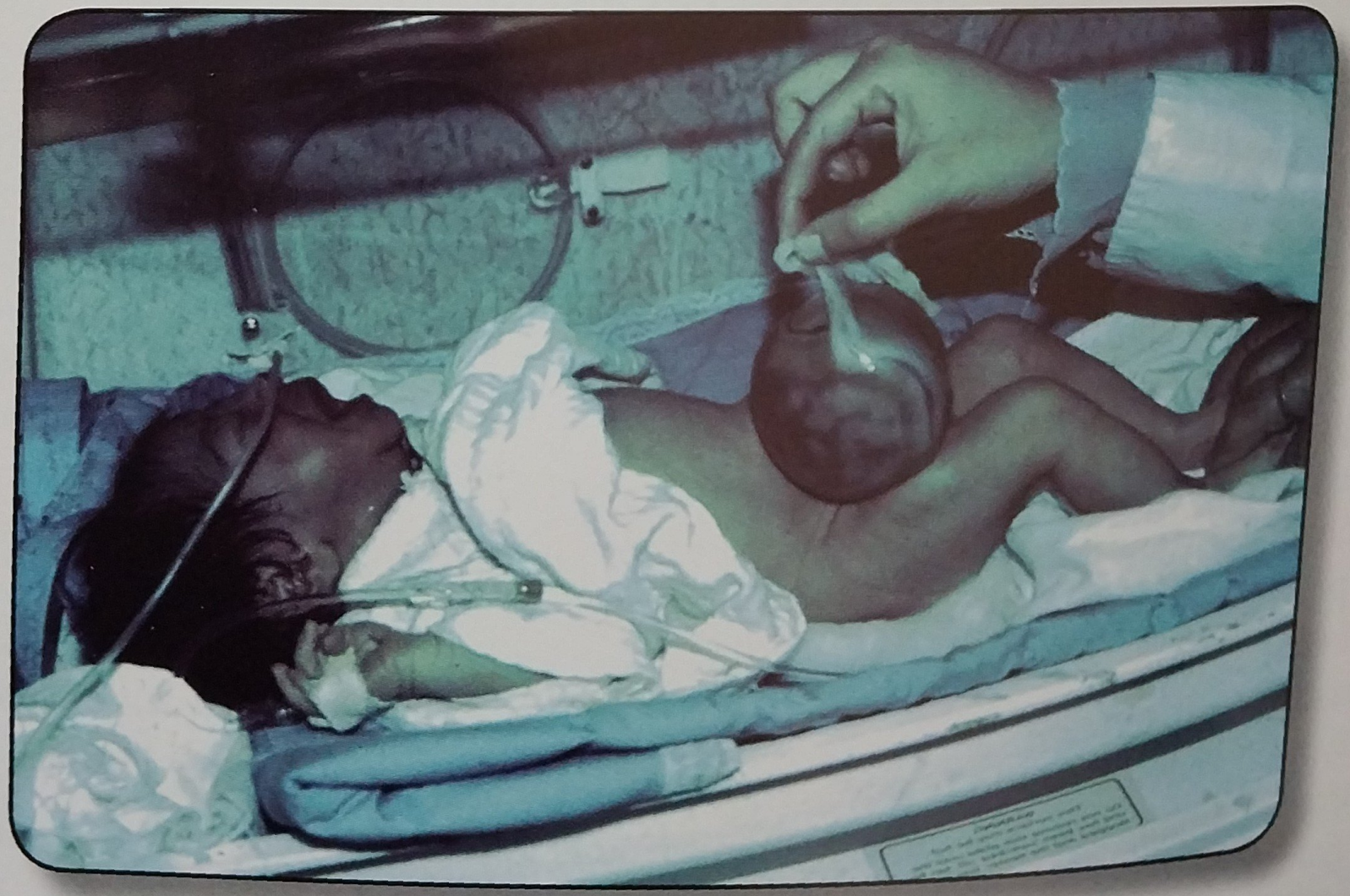
- Look for associated anomalies (common with Exomphalos)
  - Renal ultrasound.
  - Echocardiograph.
- Minimize fluid and heat loss.
- Prevent compression on extruded bowel.

Pre-op preparation.

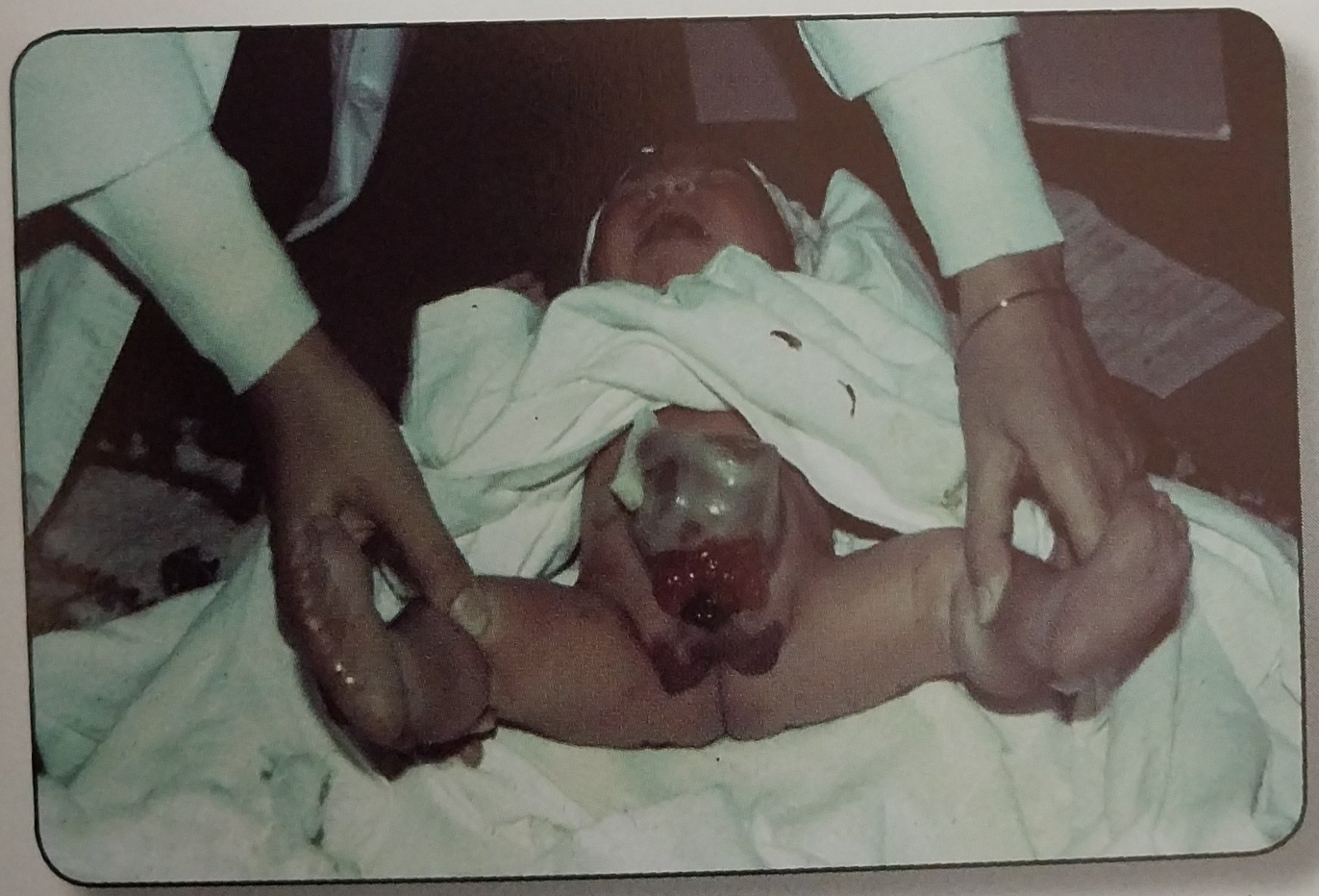
- Ensure full work-up done.
- Antibiotics prophylaxis.

Post-op care.

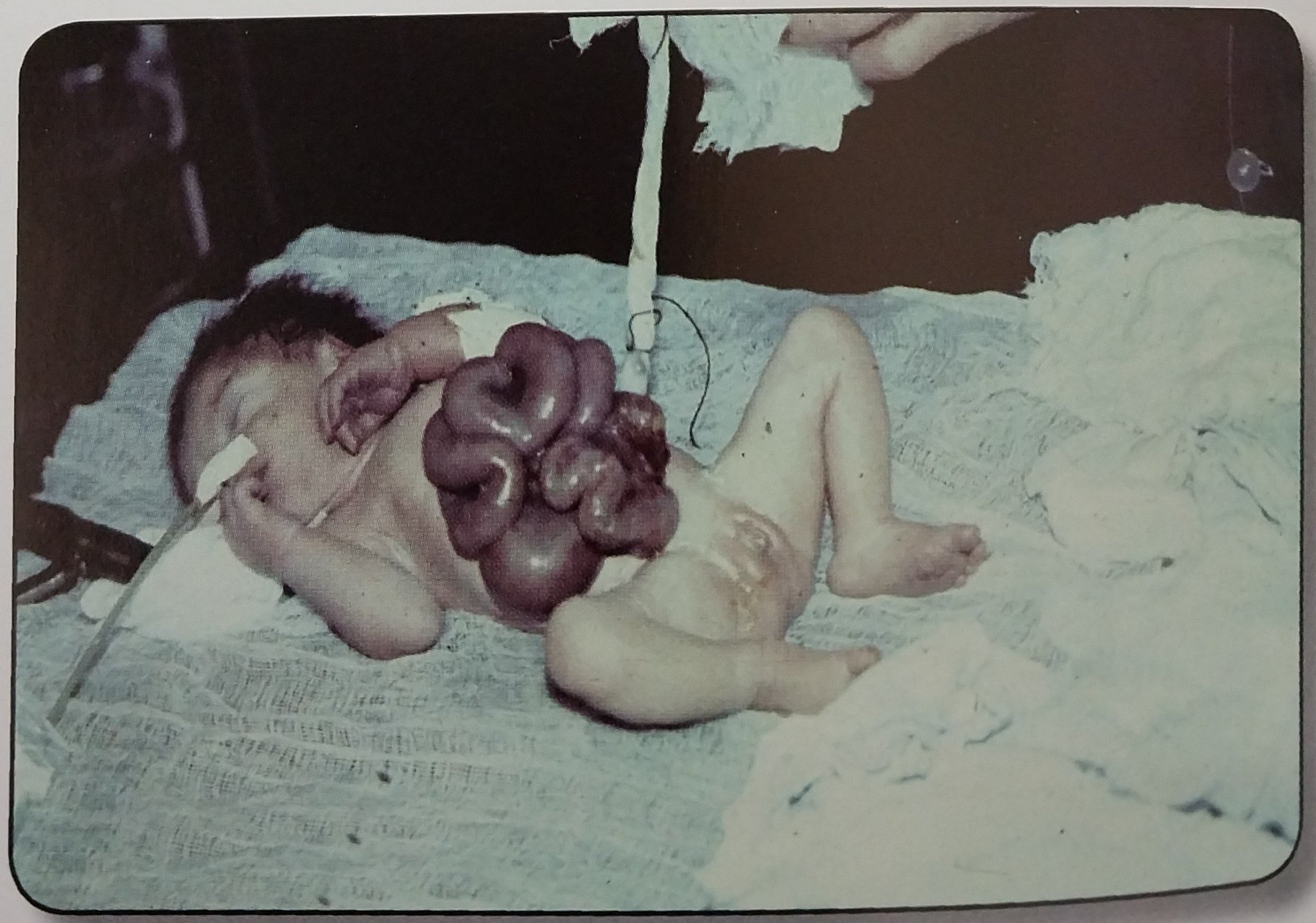
- Continue antibiotics.
- Usually ventilated.
- May need abdominal silo if can't close primarily and delayed closurre.
- Large exomphalos with intact sac, flamazine is applied to the membrane and allowed to granulate.
- Especially in gastroschisis will need central access for TPN post-op.



Exomphalos, Loops of the bowel in side the sac.



Vesico – intestinal fissure with associated exomphaluss
(Ectopic Vesicae + Imperforated Anus with Recto-Vesical Fistula)
(Lower midline syndrome)



Gastroschisis (Abdominal wall defect)

Important Notes For The Resident
Anterior Abdominal Wall Defects (Gastroschisis & Exomphalos)

The principles of immediate postnatal management.

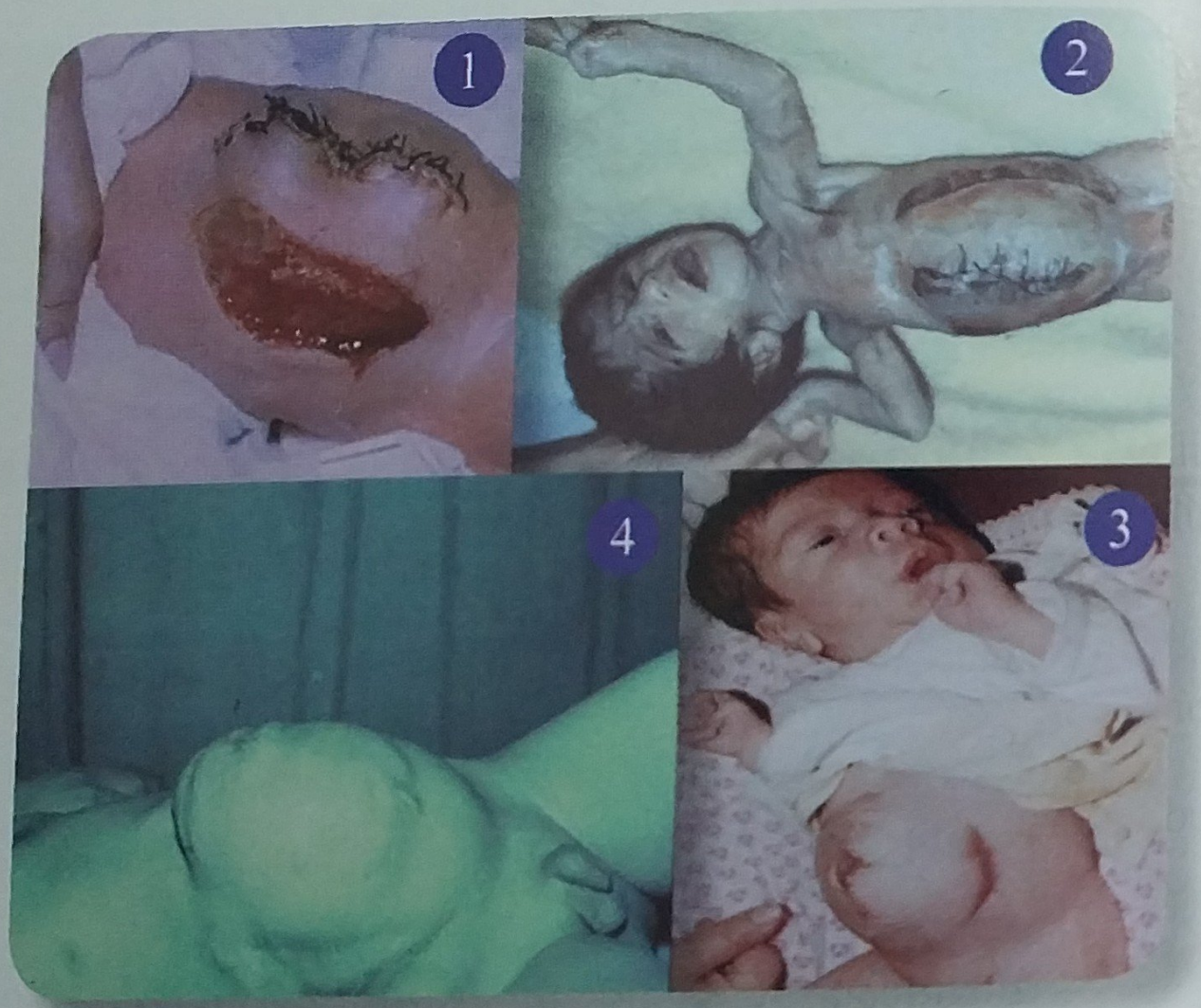
1- correcting hypovolemia.
2- preventing hyopthermia.
3- monitoring for signs of sepsis.

In Gastroschisis and rupture Exomphalos
Surgery is performed as soon as possible by:

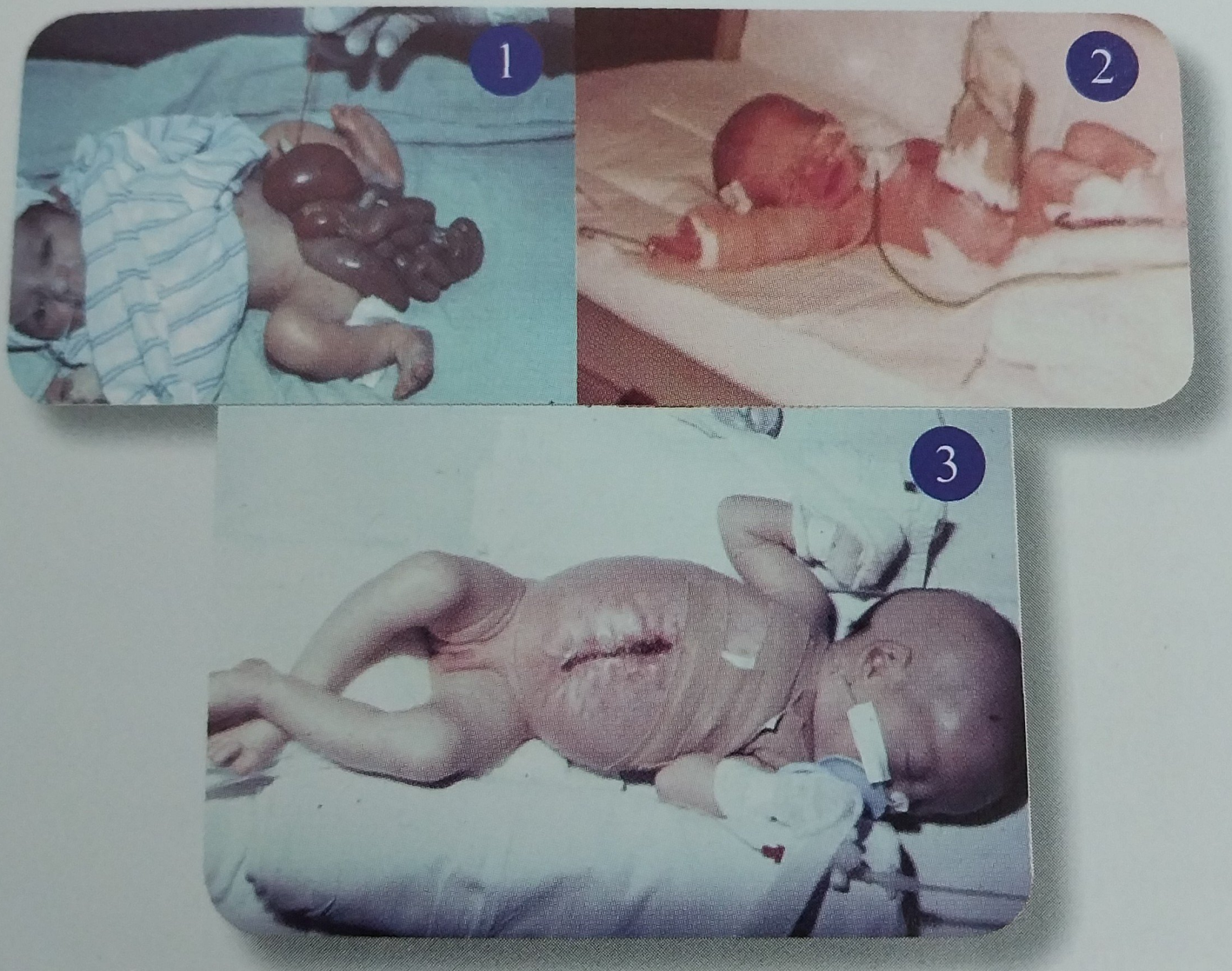
1- primary closure.
2- staged closure, to avoid compartment syndrome (increase intra- abdominal pressure) by:
   1- Silastic silo formation over the exposed viscera.
   2- Myo – cutaneous mobilization flap.

Nonoperative management of omphaloceles with intact sac reserved for:

1- Extremely large defects.
2- A small abdominal cavities.
3- high risk infants with associate congenital anomalies.



Myo – cutaneous mobilization flap.



Gasroschisis treated by silastic silo formation.

Important Notes For The Resident

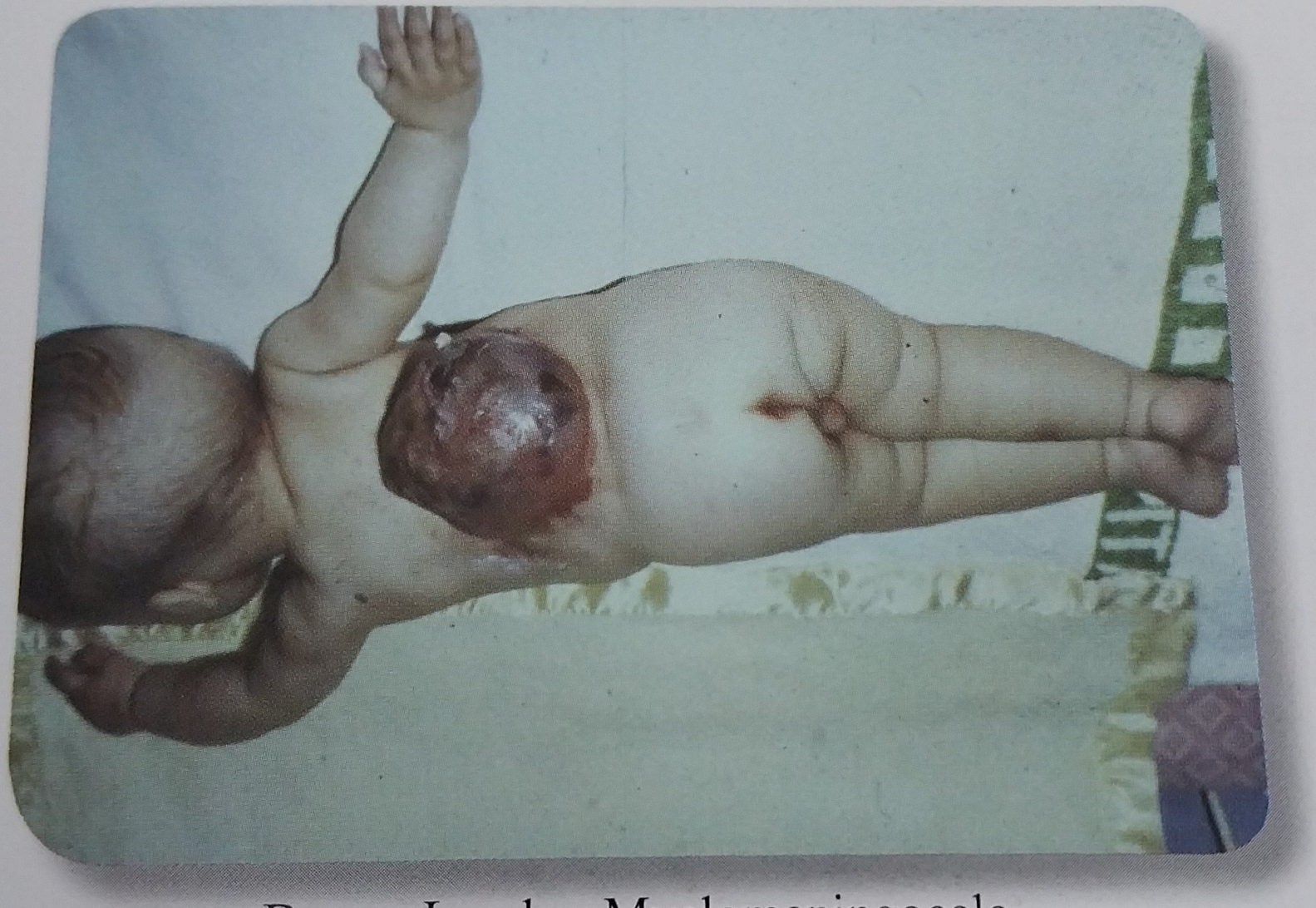
Spina Bifida (Meningocele / Myelomeningocele)

Pre – op.

* Routine labs.
* Renal Ultrasound.
* Cranial & optic nerve ultrasound.
* X-ray spine AP & Lateral.
* Antibiotic prophylaxis.

Post – op care.

* I.V.fluids for 24 hrs.
* Antibiotic prophylaxis.
* Watch for expanding hydrocephalus (OFC & Cranial ultrasound).
* Arrange physiotherapy.
* Will need MCU and DMSA in one month.
* May require prophylaxis antibiotics (Trimethoprim).



Dorso- Lumber Myelomeningocele

Important Notes For The Resident

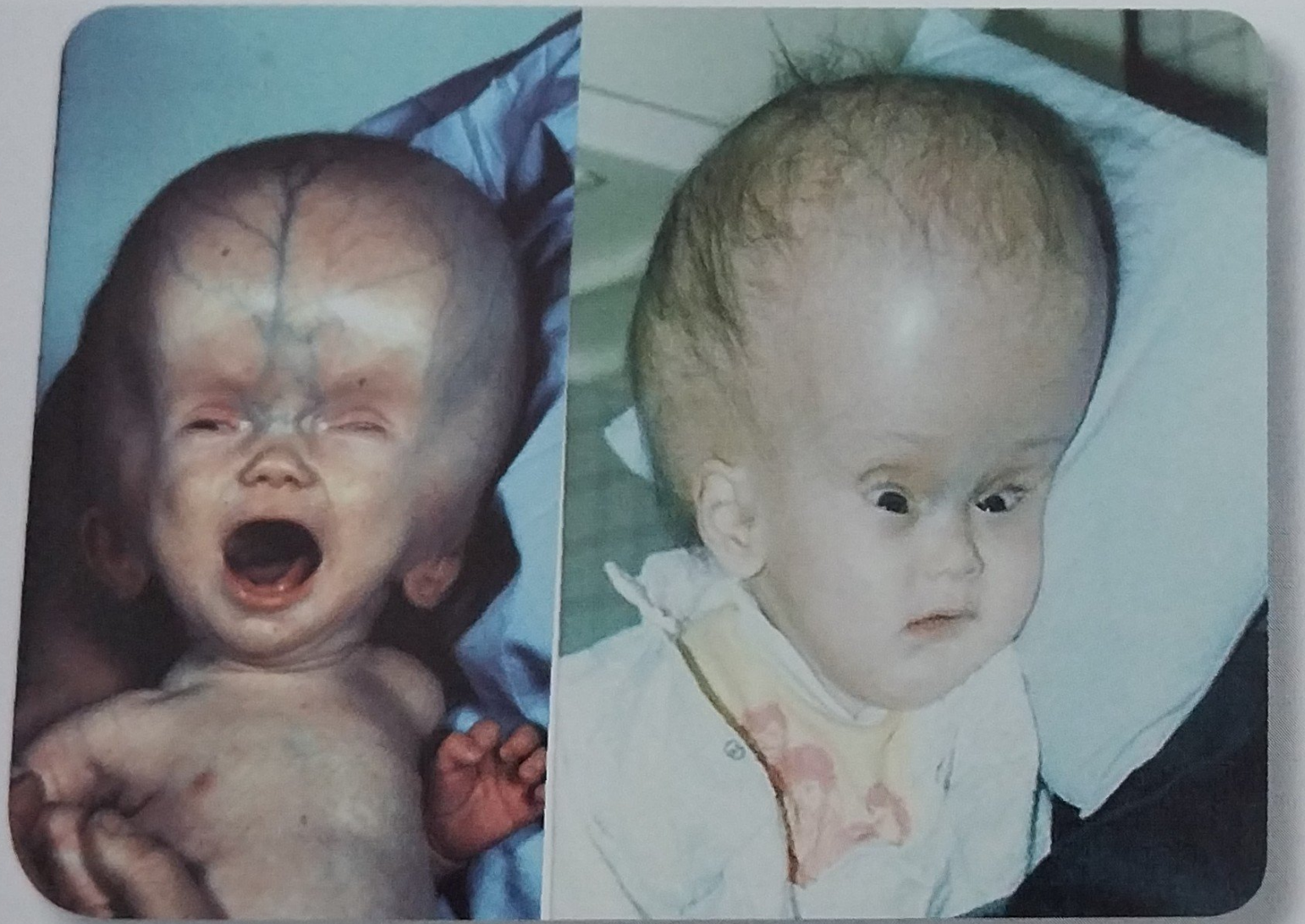
Hydrocephalus

Pre – op.

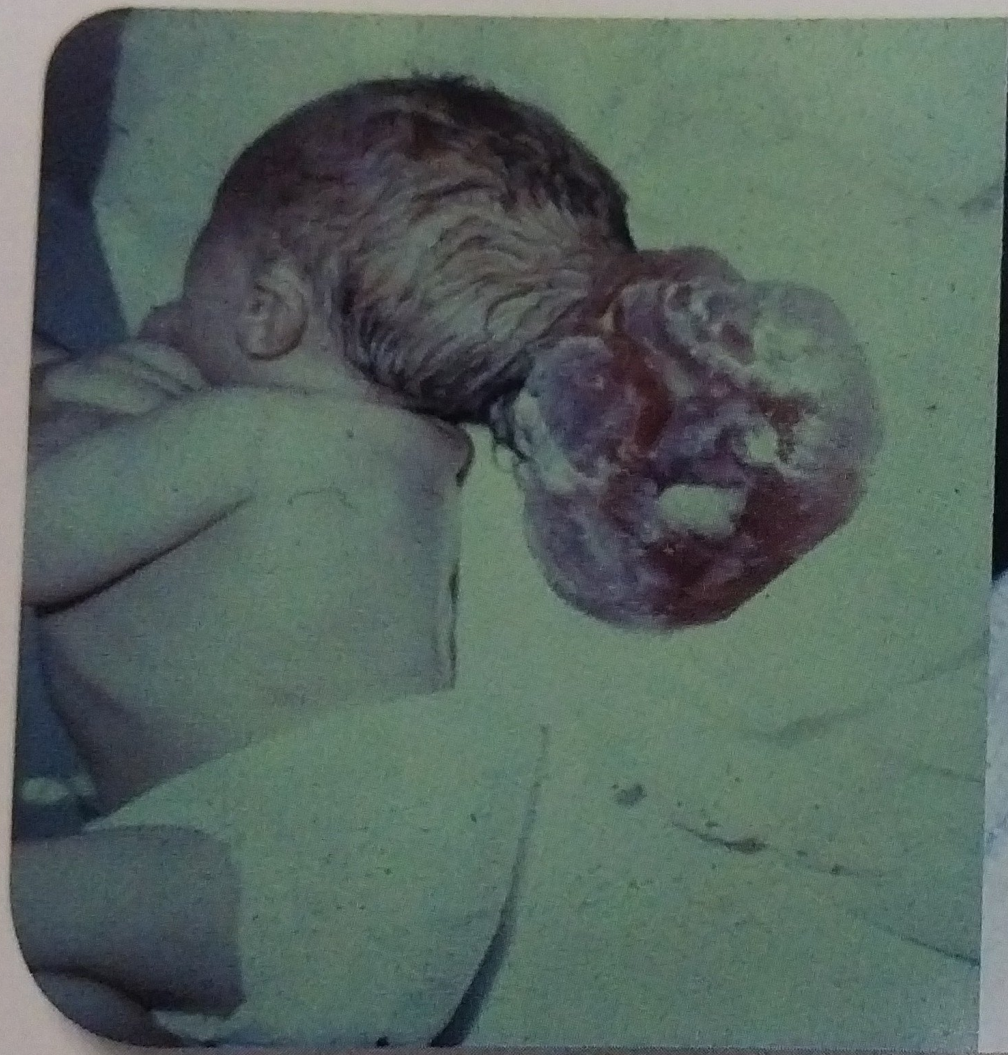
* Take a careful history.
* Identify cause (Primary or Secondary).
* Arrange CT or and MRI.
* Regular OFC measurement (Twice weekly).
* Cranial and optic nerve ultrasound.
* Ophthalmology assessment.
* Neurology assessment.
* Antibiotic prophylaxis.

Post-op. Care.

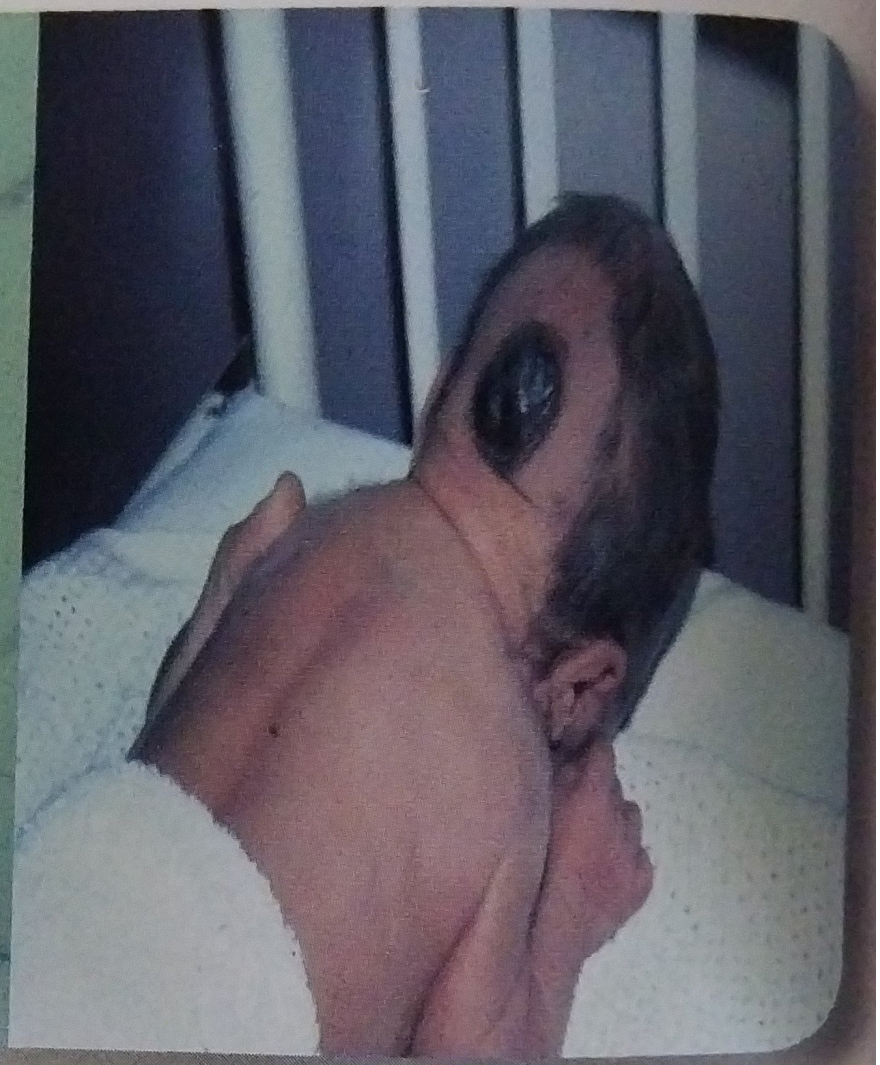
* I.V. fluids for 24 hrs.
* Antibiotics prophylaxis.
* Cranial and optic nerve ultrasound.
* Regular OFC measurement.



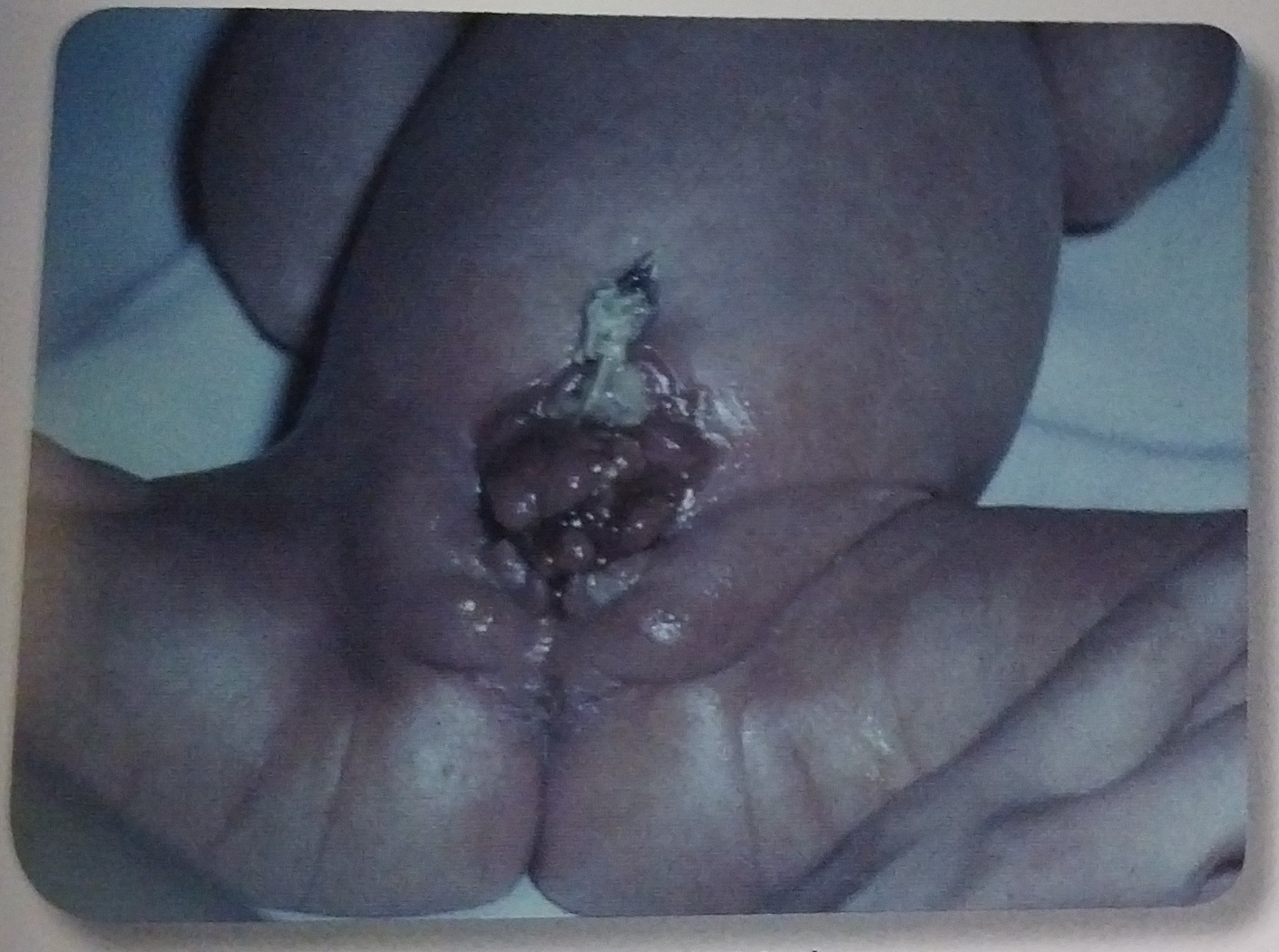
Hydrocephalus



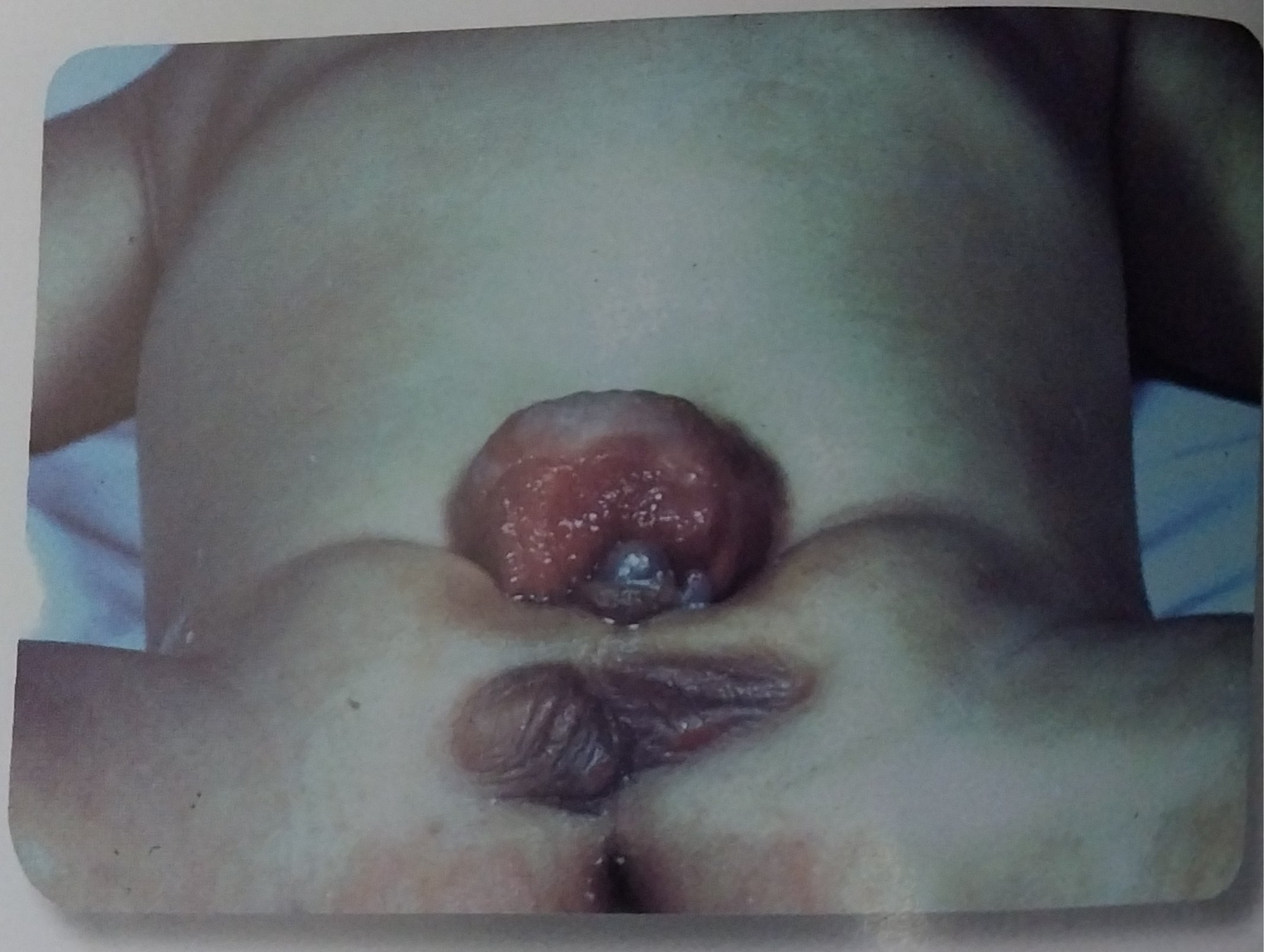
Huge Occipital Encephalocele



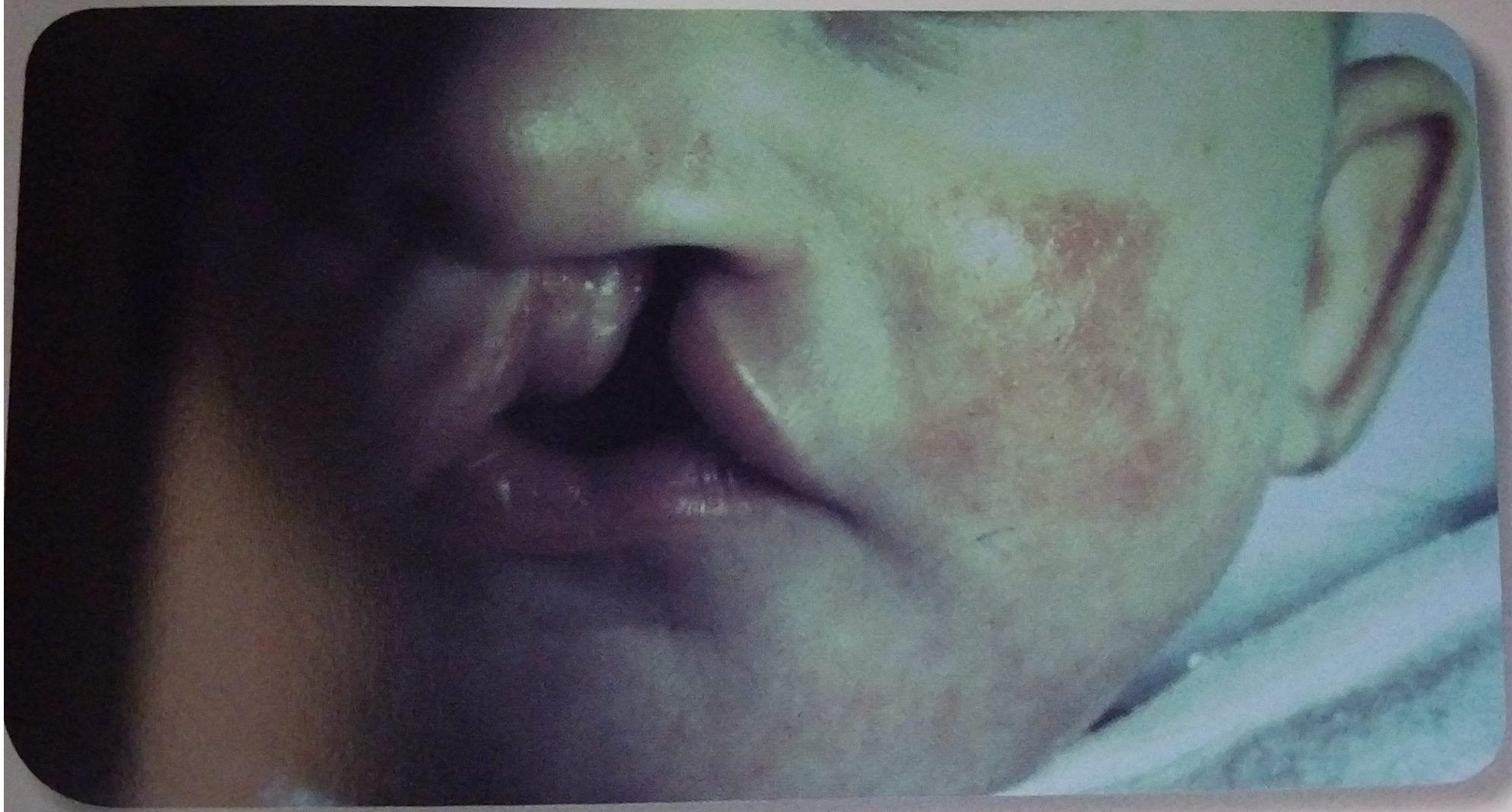
Encephalocele



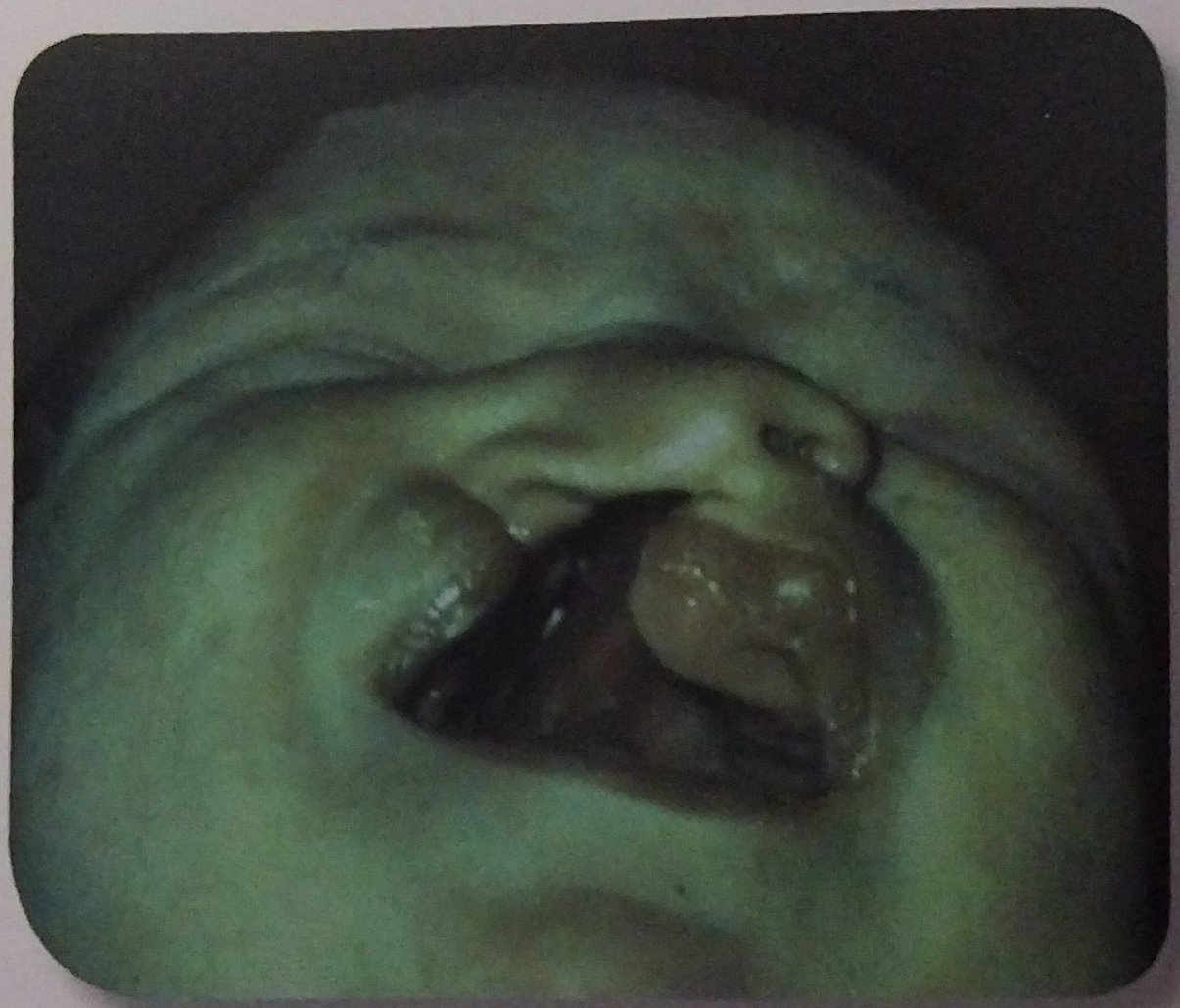
Female Ectopic Vesica



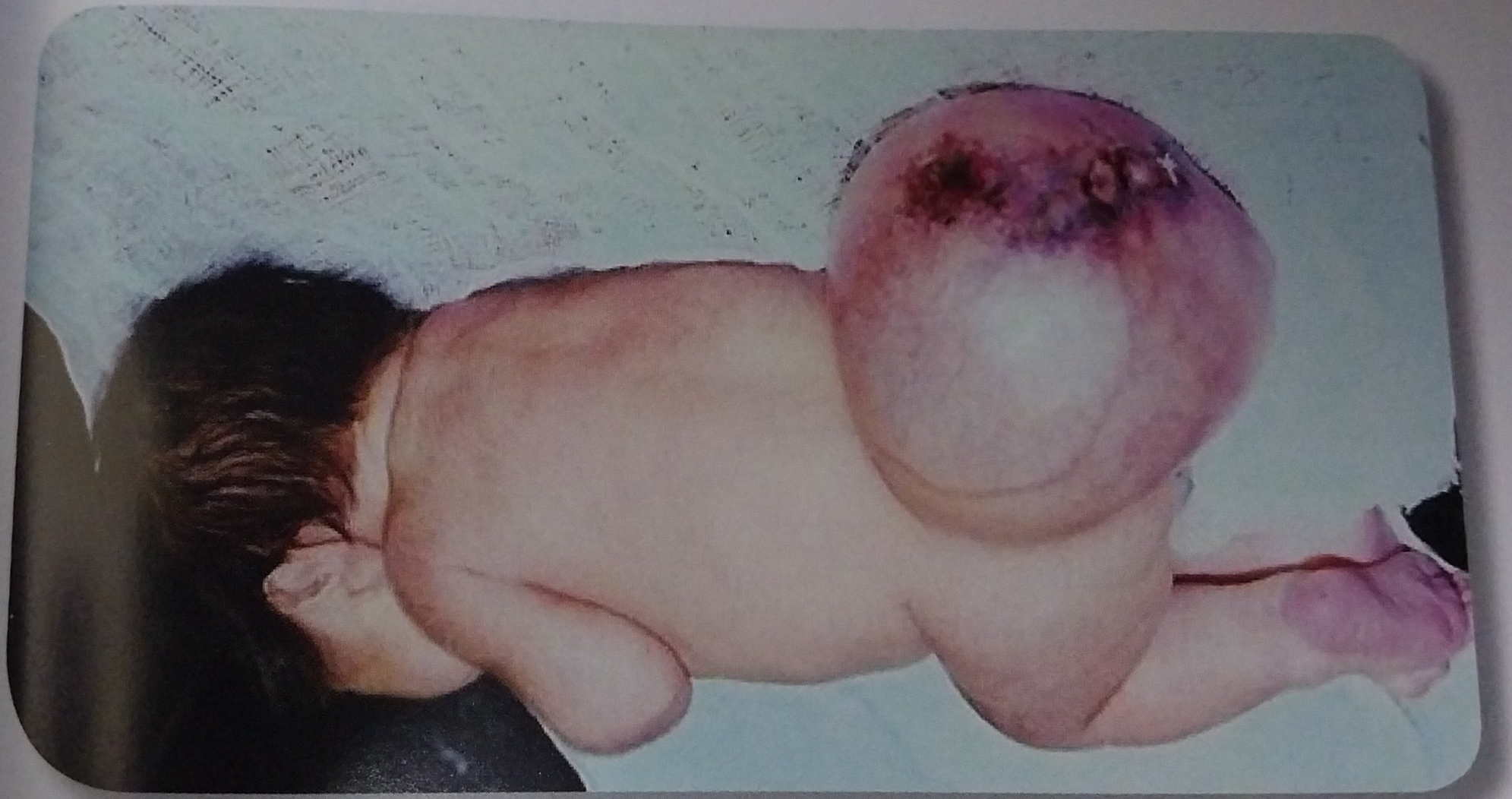
Male Ectopic Vesica



Cleft lips



Cleft palate and lips



Sacrococcygeal Teratoma

Signs & Symptom In Newborns

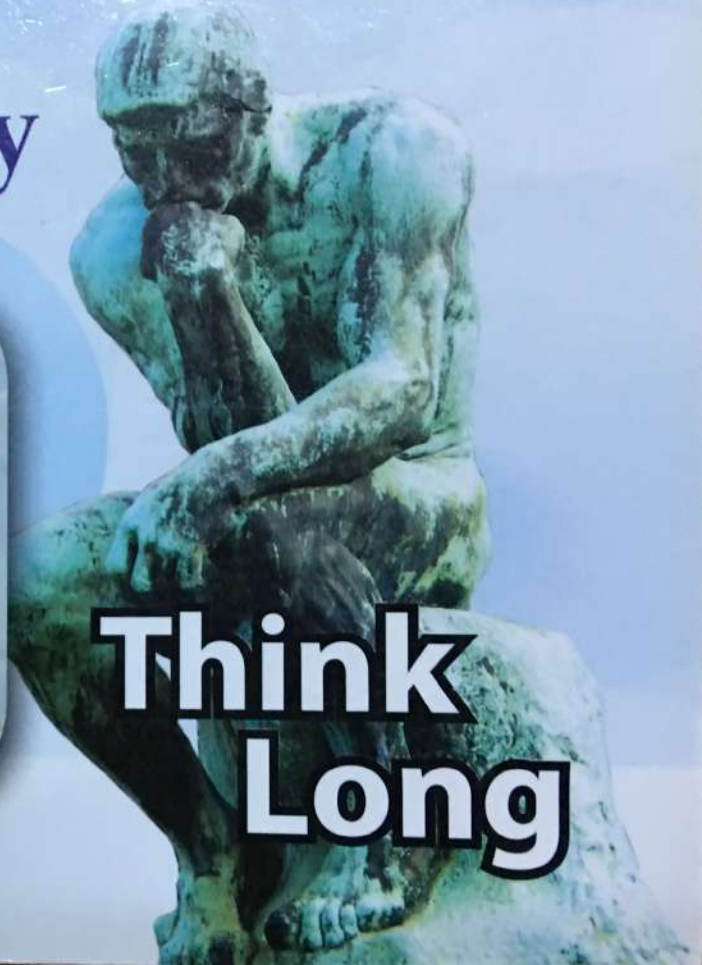
They are required neonate cares and should be evaluated for any abnormalities might need surgery.

Such as

- Rapid respiration
- Difficult respiration or cyanosis.
- Excessive salivation
- Abdominal mass
- Inability to pass urine
- **Abdominal distension**
- **Bile stained vomiting**
- **Failure to pass meconium**
  P/N (meconium is passed by 95%of all normal Infants within 24 hours)
- Convulsion
- Lethargy
- Jaundice

Paediatric and Neonate Surgery

GUIDE TO HOUSE SURGEON



Think Long

Dr. A. Al Rawi / FRCS

Causes of neonate intestinal obstruction

Mechanical

Intrinsic (In the wall)
- Atresia
- Stenosis

Intra lumen
- Meconium Ileus

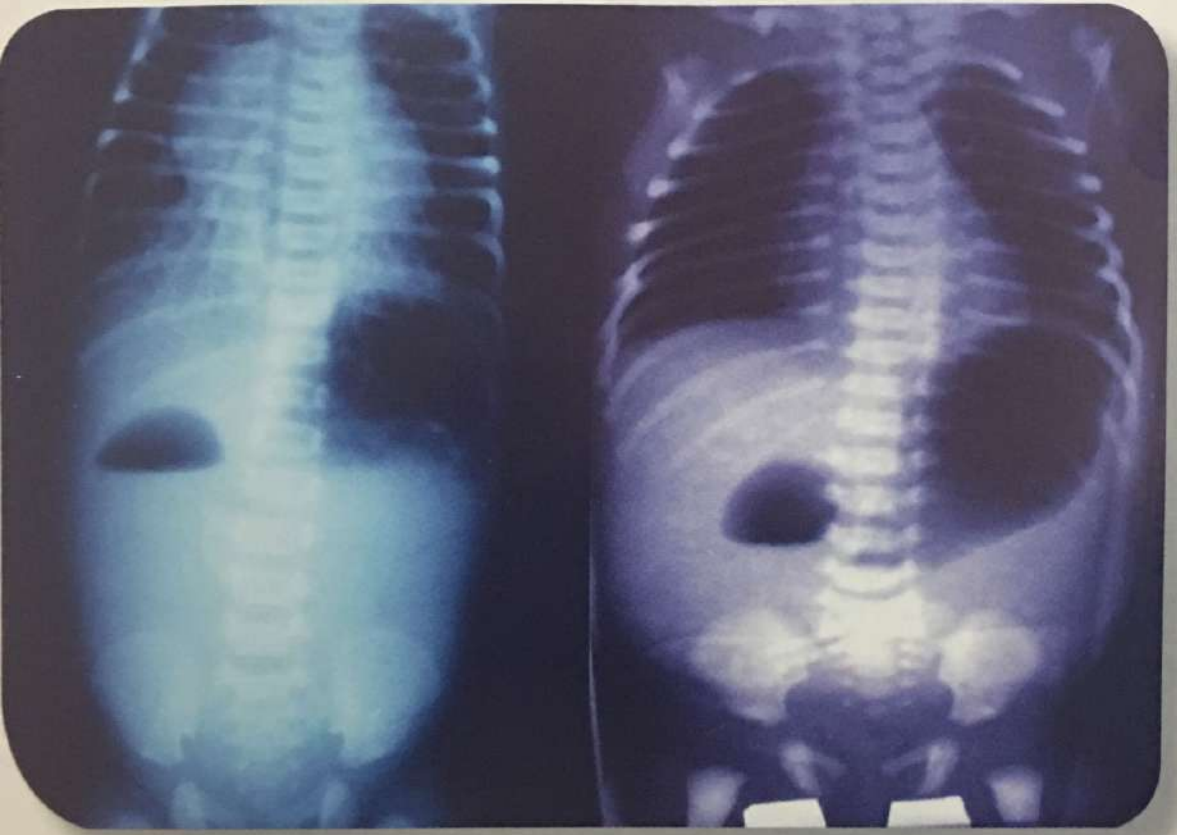
Extrinsic
- Malrotation
  - Diaph – hernia
  - Volvulus

Neurogenic
- Aganglionosis
  - Hirschsprung`s

Functional
- Sepsis
- NEC
- Prematurity
- Drugs in labour

Duodenal Obstruction

Extrinsic	volvulus neonatorum (caused by lad band).
	annular pancreas
Intrinsic	atresia
	stenosis
Presentation	vomiting
	(85% distal to CBD entry) → bile-stained vomit.
	30% Down's syndrome
	double bubble pattern x-ray
Treatment	duodeno- duodenostomy



Double bubble pattern x-ray

Important Notes For The Resident

Duodenal Atresia

Diagnosis

- Bile- stained vomiting from birth (90%).
- Non-bilious in (10%).
- Double bubble on plain x-ray abdomen (erect + supine).
- Down's syndrome occurs in 30% of cases.

Pre-op.

- ECG, to look for cardiac anomalies.
- If in doubt get an upper GI contrast study.

Post-op.

- Ng tube or gastrostomy tube.
- May have a trans-anastomotic tube for early enteral feeding.
- On full IV-fluids or TPN.

Malrotation
Midgut Volvulus
Volvulus Neonatorum

yolk sac

Return of the fetal (GIT) from (EEC) during the 4th.weeks the bowel undergoes rotation in a counter clock wise at the end of 11th. Weeks – 270 degree complete rotation when the process is incomplete – result (malrotation)

90° out (yolk sac) — 180° in (in abd. cavity)

- Pathology : narrow stalk (root) around SMV
  Poor attachment of the bowel
- Presentation : 30 % in the 1st. Week
  50 % before 1 month of age

mesentry border (base) are to close to each other, so it can rotate causing volvulus

Unexplained bilious vomiting is a surgical emergency until Prove otherwise.

- Treatment : Ladd`s procedure
  Incidental appendicectomy

الطبيعي بكون محدود من L1 لـ L5 و غير هيك راح يكون في اشي اسمه lad band.

so 2 problems volvulus + bands

Important Notes For The Resident

Malrotation

Diagnosis.

- Bile vomiting often the only sign.
- Plain film may show proximal small bowel to right side.
- An upper GI contrast study is the definitive investigation.

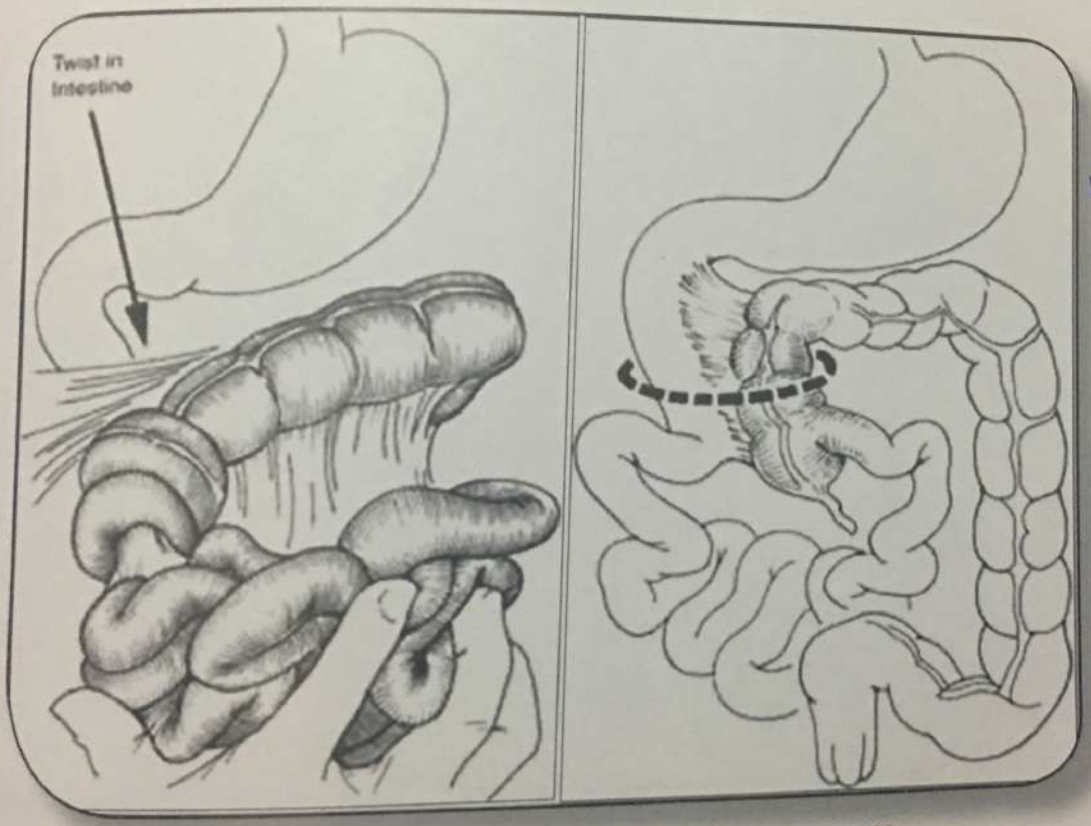
Pre-op.

- Resuscitate.
- IV.antibiotics.

Post-op.

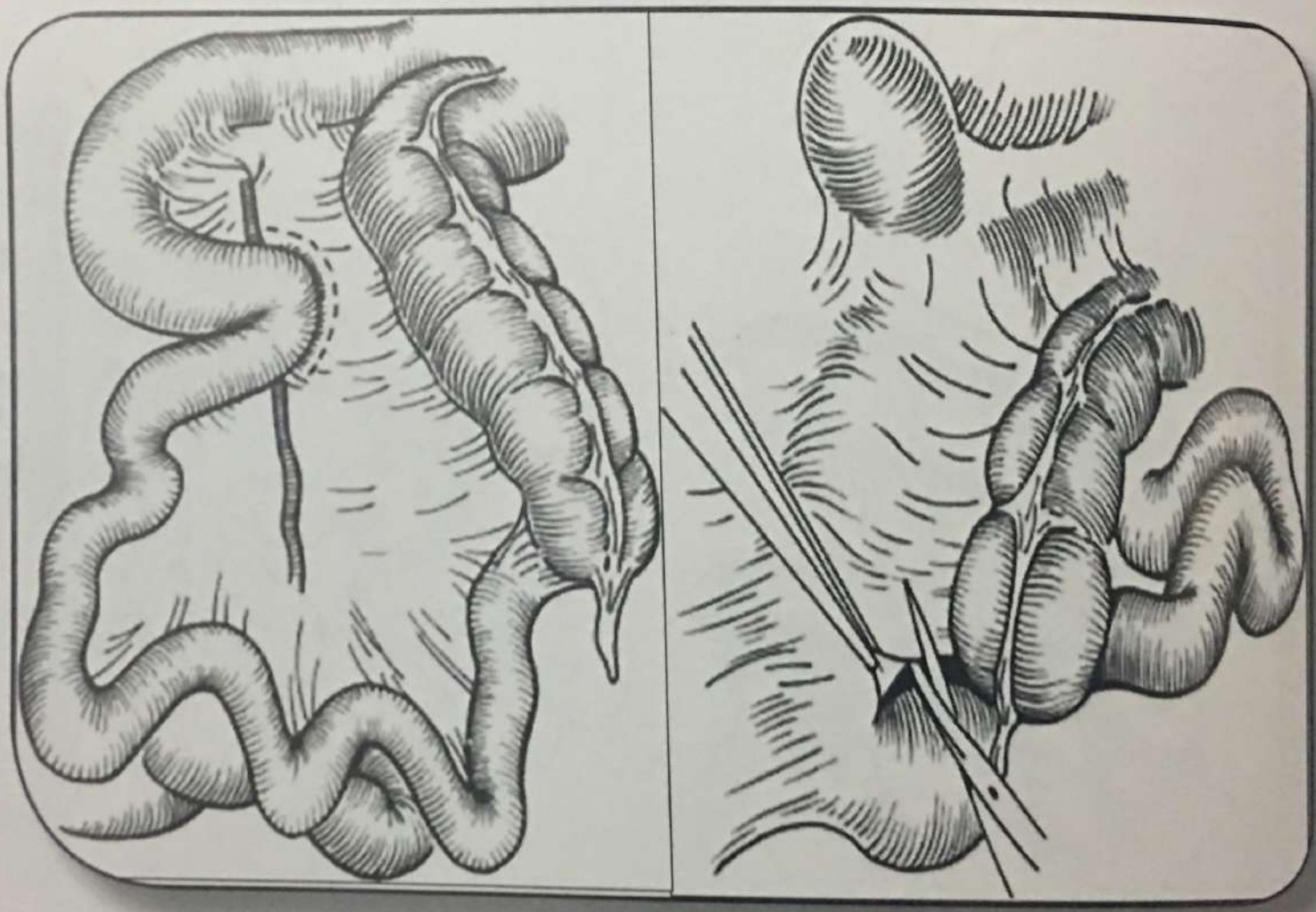
- IV. Fluids for at least 24 hrs.
- Antibiotic course according to findings at surgery.

if bleeding per-rectum occurred ⇒ late diagn

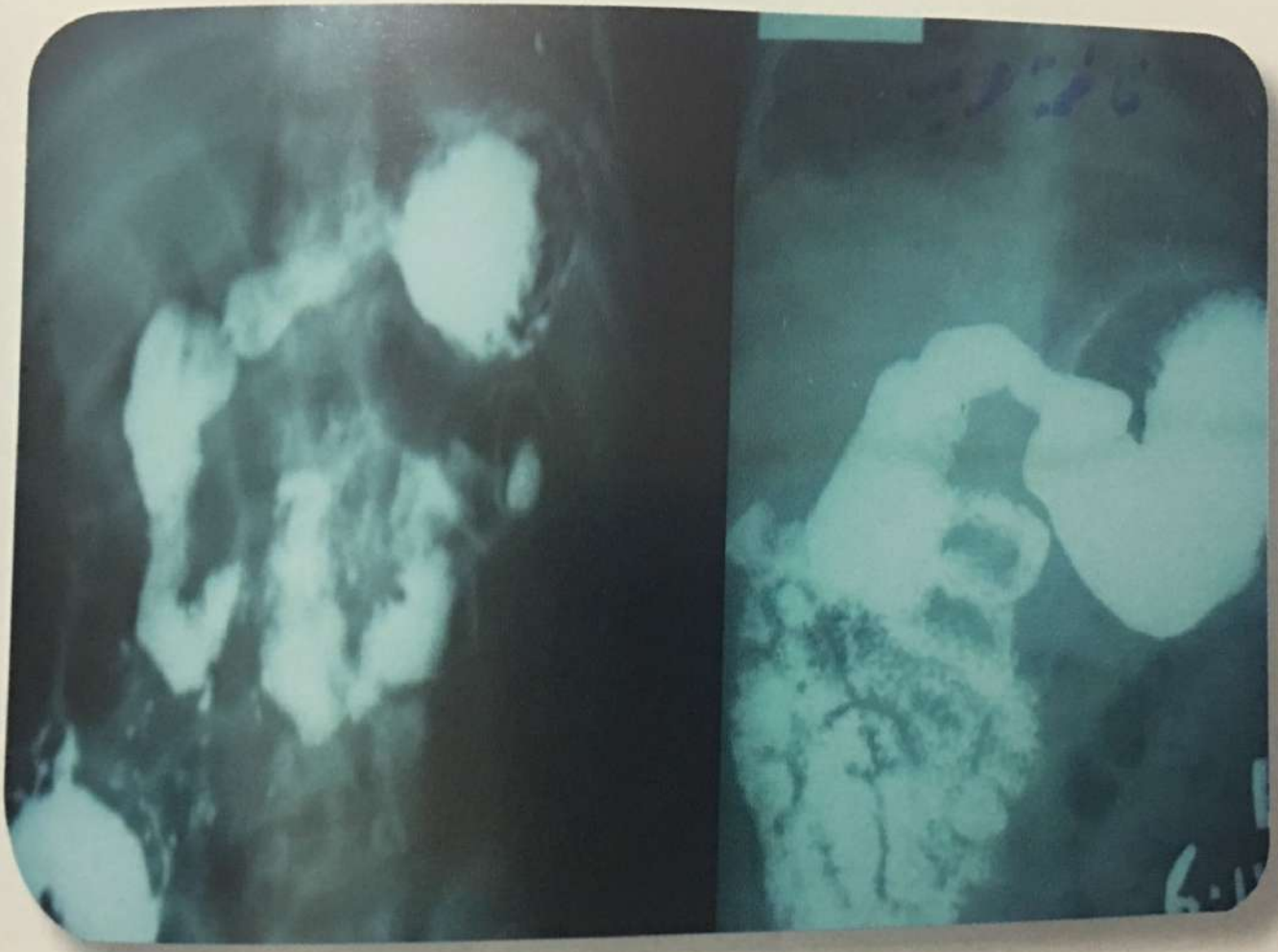


Volvulus Neonatorum (1-12) UNSW

notice that the cecum is high. Just next to DJ flexure



Ladd`s procedure(1-12)UNSW



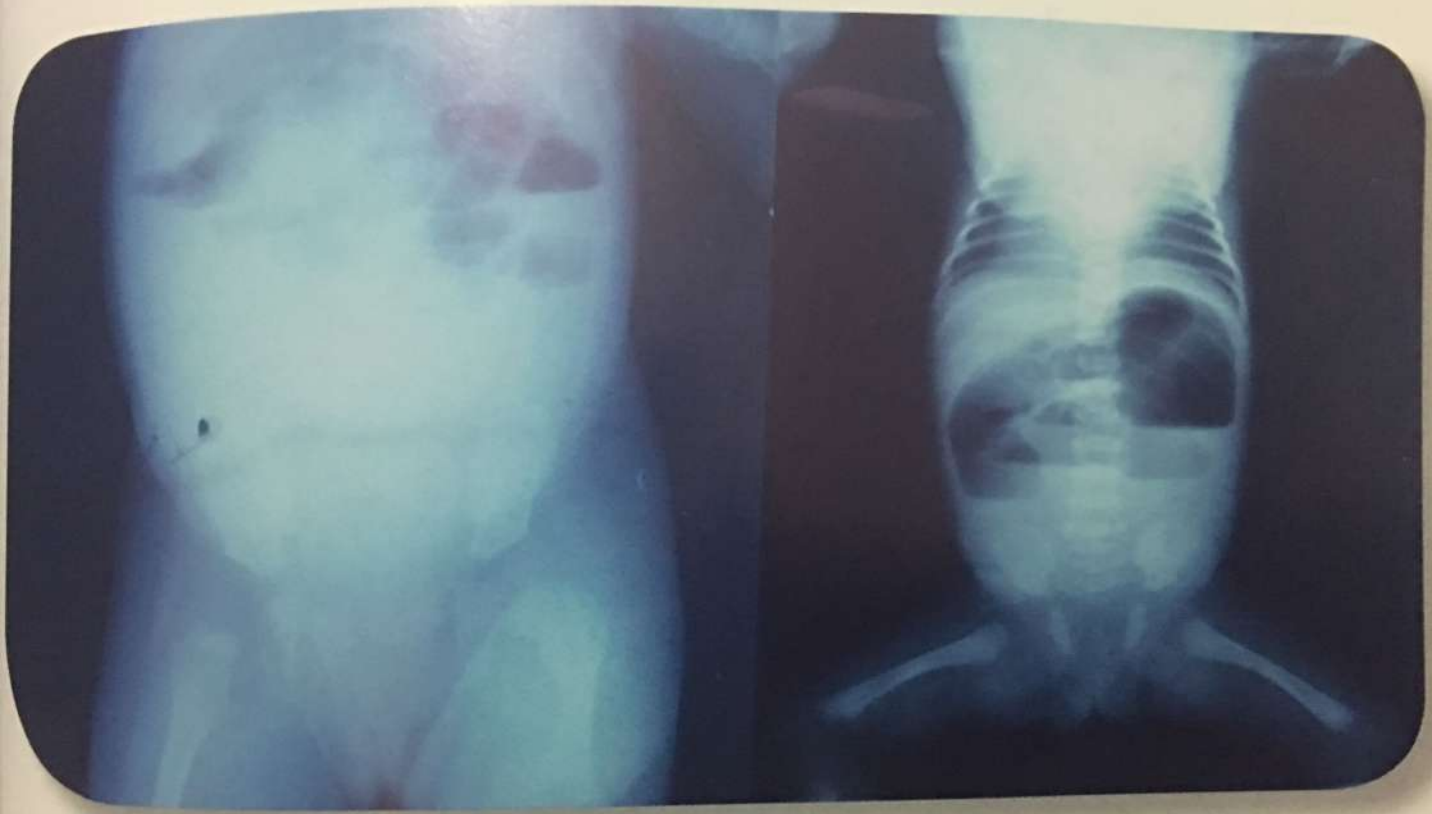
Barium Meal and follow through in malrotated cases

Jejunum
Ileum **Atresia**
Colonic

- Common in the Jejunum
- Single atresia 90 %
- Multiple atresia 10 %
- 10 % as complicated of meconium obstruction
- Low incidence in Colon 5 %
- Associated anomalies : Cloacal extrophy
  Abdominal wall defect

Diagnosis : Fluid level progressive down to level of obstruction

Treatment : Remove the poor blood supply segment Provide a functional an



Erect views for neonate intestinal obstructions

Important Notes For The Resident

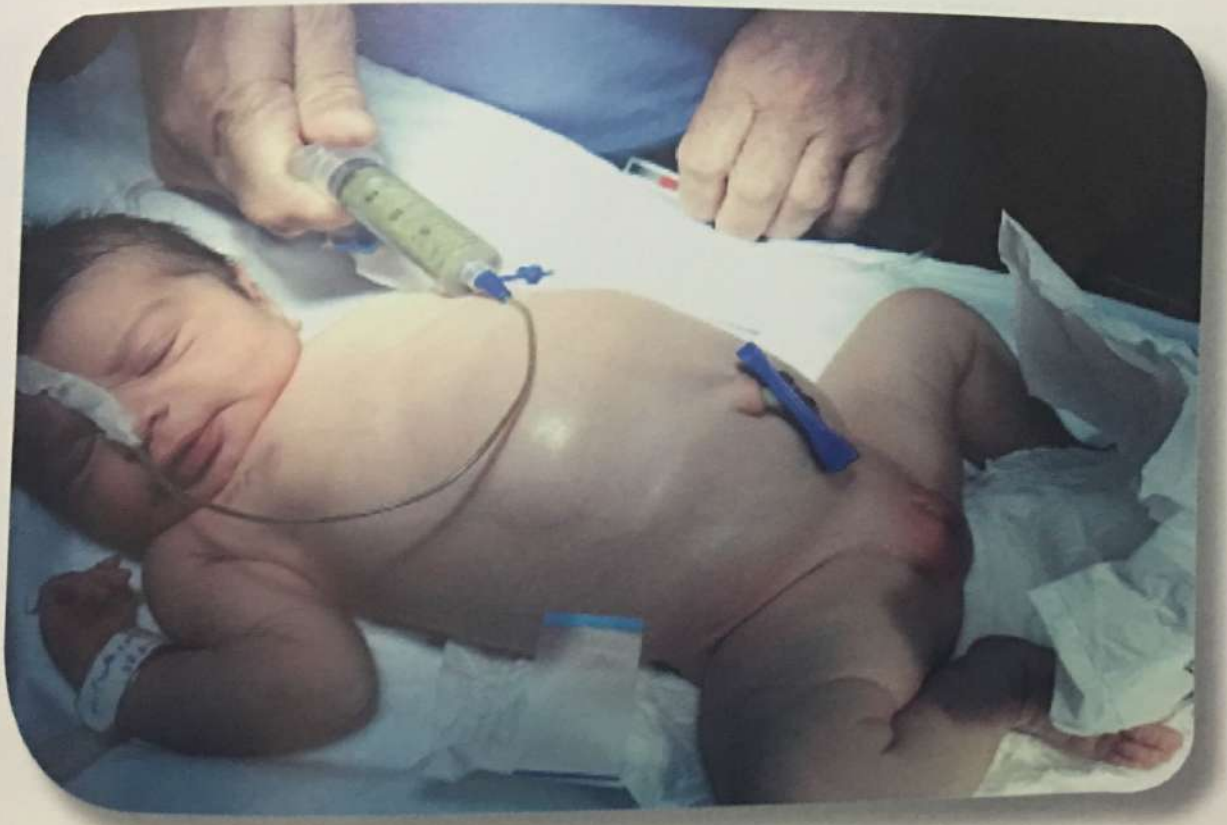
Intestinal atresia

Pre-op

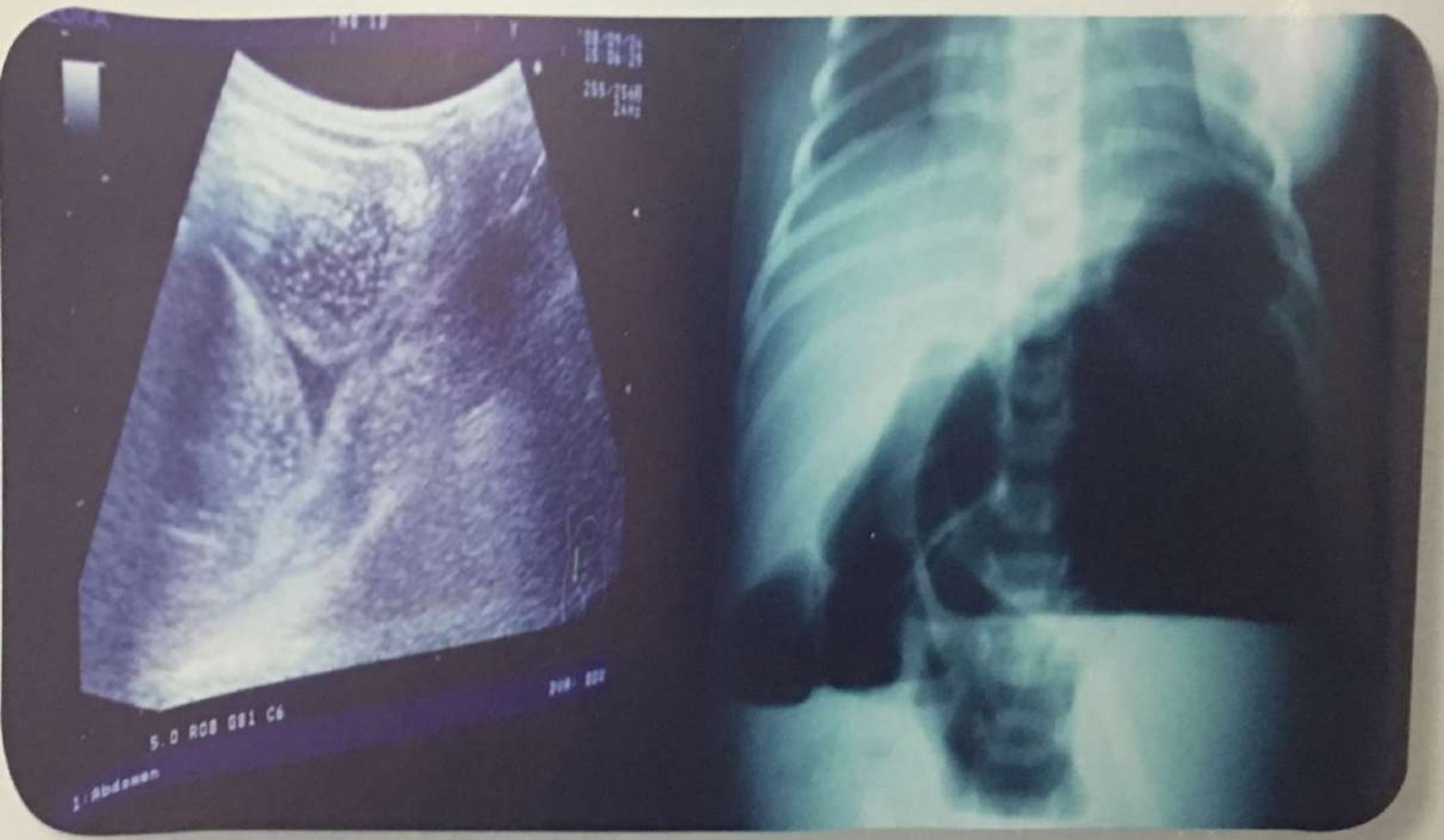
- Plain abdominal x-ray (erect & supine).
- Prophylaxis antibiotics.
- FBC, U&E, X- match.

Post-op

- Routine observations.
- Antibiotic prophylaxis.
- I.V. fluids & TPN until the bowels regain its function.

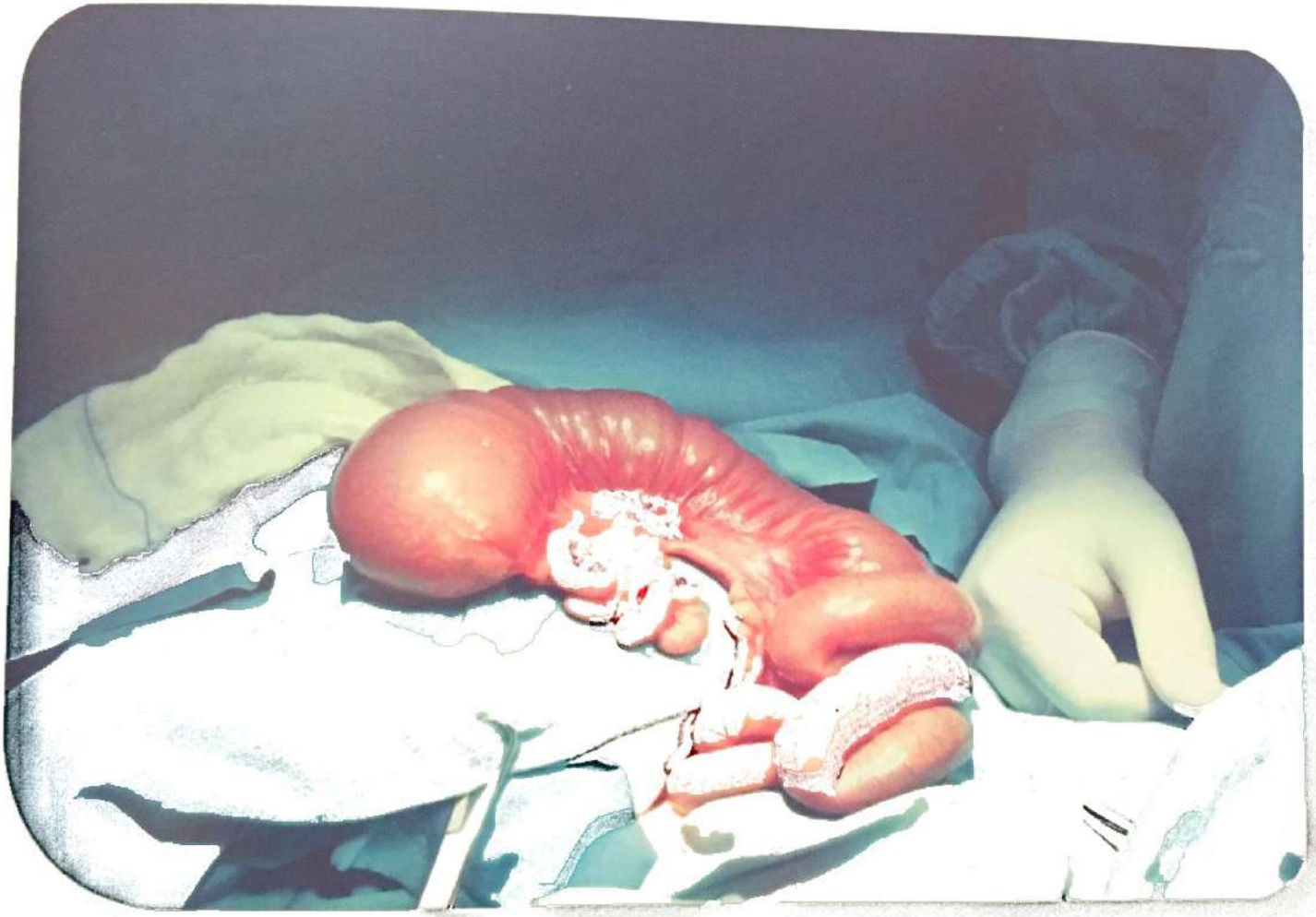


Neonate Intestinal Obstruction

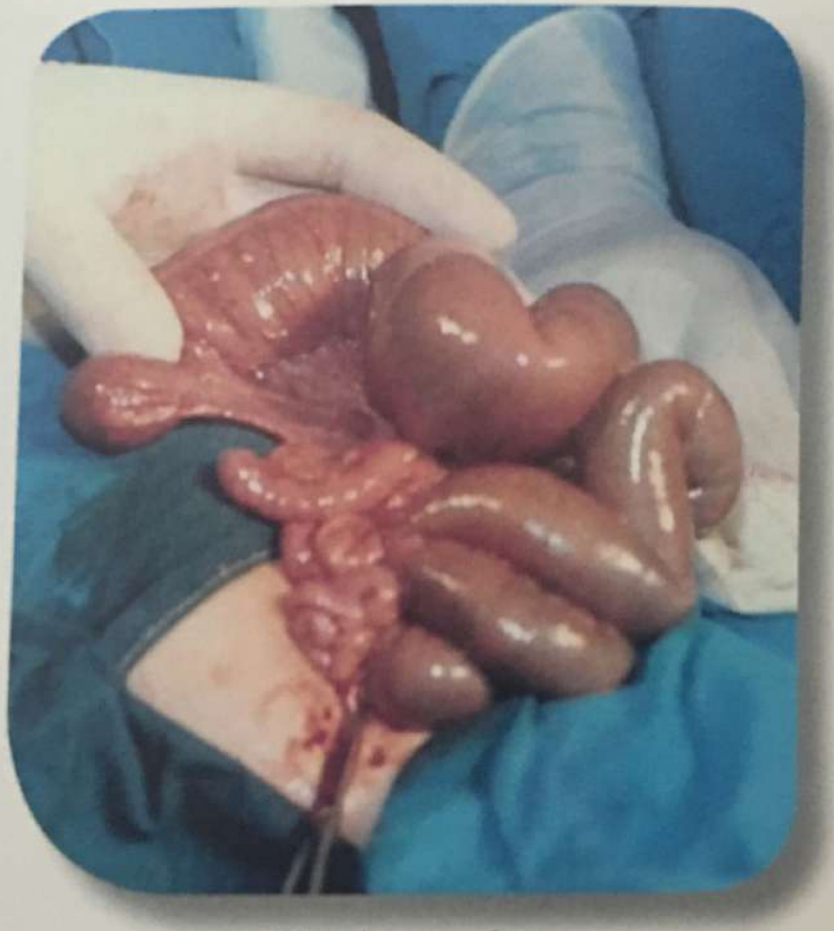


Ultrasound

Erect plain abdomen x-ray Ileal Atresia



Multiple Ileal Atresia



Ileal atresia

Meconium Ileus

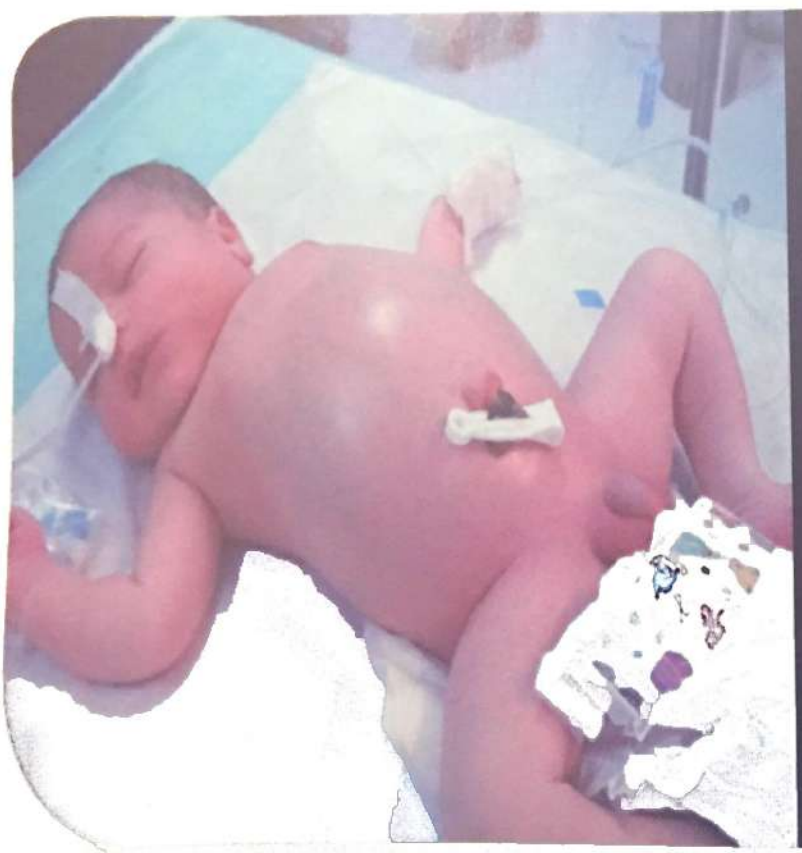
Obstruction caused by inspissated meconium in the newborn

- **Incidence** 16 % of patients with cystic fibrosis → every one with CF ??
  insufficiency of the pancreatic exocrine
- **Presentation** bile stained vomiting
  abdominal distention
  fail to pass meconium (Ileus) مثل العجين
  palpable masses →

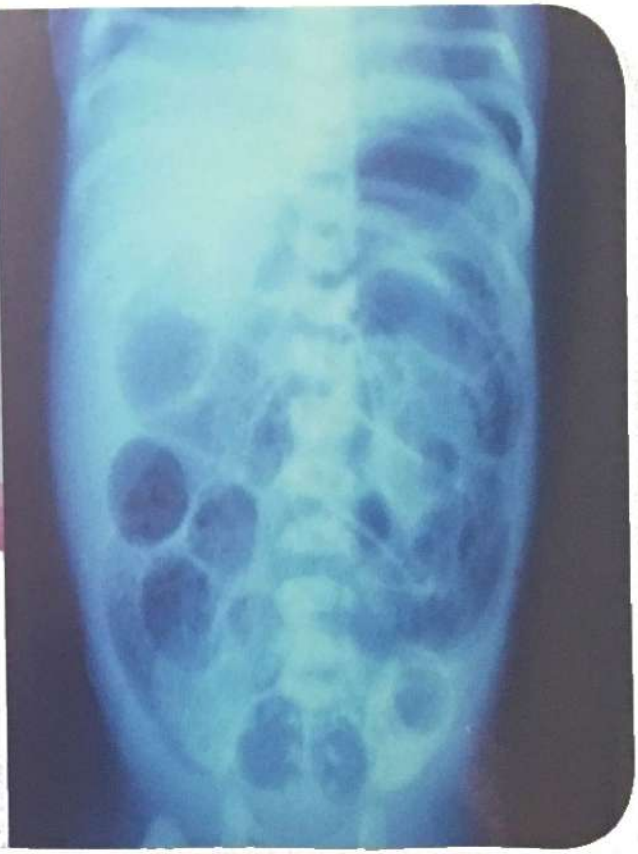
Type	**X – ray**
Simple (uncomplicated)	
thickened meconium	mottled meconium
obstructs the mid – ileum	fail to form fluid levels
proximal dilatation	soap – bubble appearance
bowel wall thickening	
Complicated	calcifications
abdominal wall edema, volvulus,	free air
atresia, necrosis, perforation,	clustering
meconium peritonitis and	frank distention
pseudocyst formation	

- **Management**
  - Conservative — Non – surgical — gastrograffin enema
    saline bowel washouts.
  - Surgical — Laparotomy ,bowel resection with or with out ilostomy

+types ??



Meconium Ileus



Soap – bubble appearance
+ mottled meconium

no fluid level.

Important Notes For The Resident

Meconium Ileus

- Usually this is due to hyperviscous meconium in the small bowel.
- Cystic fibrosis is often the cause.
- Clinical presentation is that of a neonate with intestinal obstruction.
- A family history of cystic fibrosis will suggest the diagnosis. **
- Plain x-ray of the abdomen shows marked bowel distension.
- The erect and supine films may be almost identical.
- A snowstorm appearance with few if any fluid levels.
- In complicated cases, intra peritoneal calcification may be visible.

Management

- A dilute gastrografin or an isotonic contrast enema.(close observation for the risk of perforation).
- Repeating the procedure at daily intervals for 4-5days.
- Adequate I.V.fluids are required to replace the fluid lost.
- Conservative management is successful in about 60%.

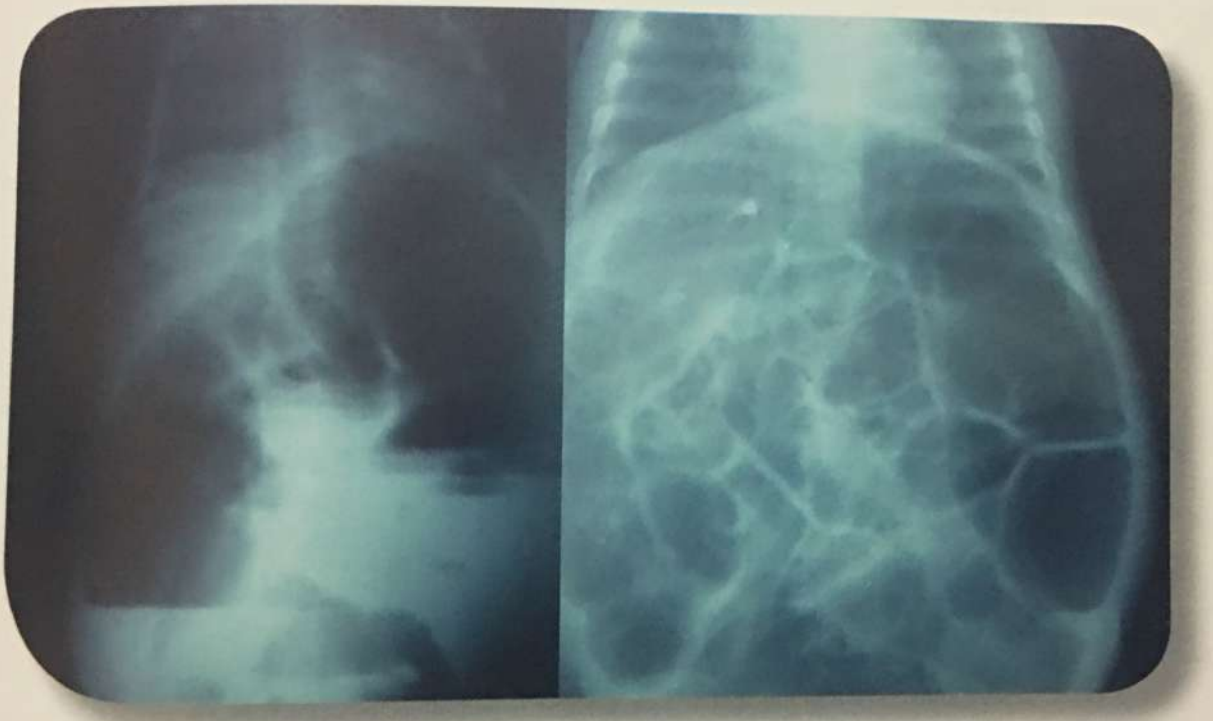
Surgery Required

1- With Ileal atresia. 2- In case of perforation.

3- Not responding to conservative management.

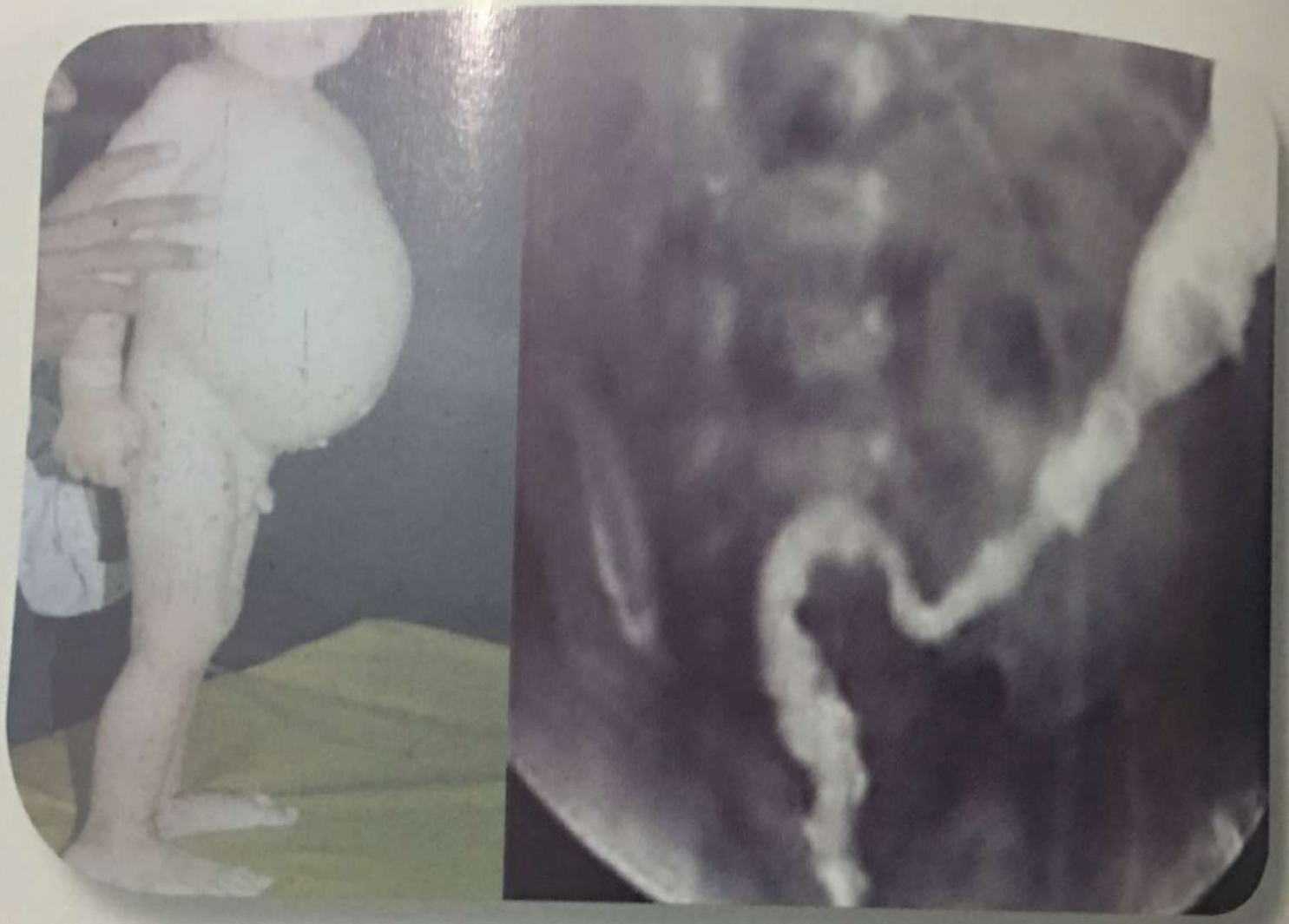
Hirschsprung`s Disease

Incidence	1/ 5000 birth
	Commonest cause of intestinal obstruction in the newborn
Types	Short aganglionic segment 75 %
	Long aganglionic segment 17 %
	Total colonic aganglionosis 8 %
Presentation	Complete obstruction
	Partial obstruction
Classical Signs	Delay passage of meconium (24 – 48 hrs.)
	Bile stained vomiting
	Abdominal distention
Diagnosis	Rectal examination, empty rectum, tight sphincter
	X- ray erect, dilated bowel with air/fluid levels.
	Barium enema, positive transition zone & barium retained over 24 hrs, in the colon.
	Rectal biopsy, absence of ganglion cells.
	Histochemical, increase staining for acetylcholinesterase activity.
Treatment	Multiple- staged approach – diversion colostomy
	Pull – through operation
	One – stage approach – open procedure, laparoscopically or transanally



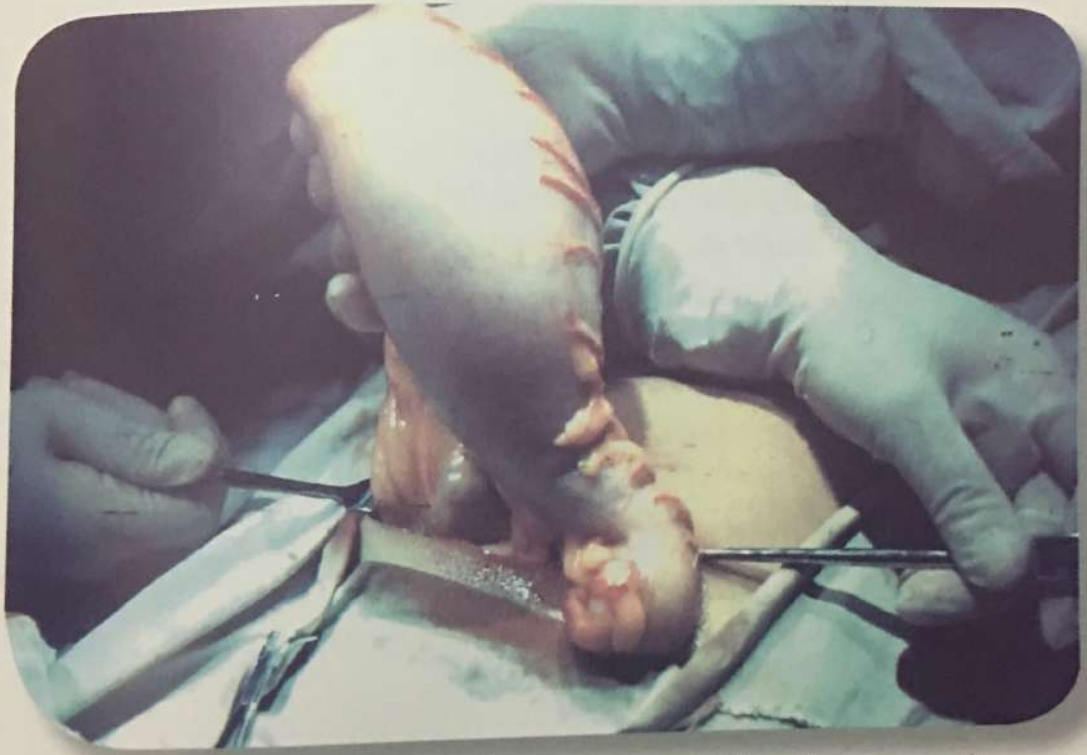
Erect Supine

Hirschsprung`s Disease, plain x-ray , erect and supine



(Transition Zone) Barium Enema

Hirschsprungs disease features in children



Transition Zone (the cone of Hirschsprungs)

Important Notes For The Resident

Hirschsprung's Disease

- Suspected if delayed passage of meconium.
- Barium enema will usually demonstrate the features of diagnosis.
- Definitive diagnosis is made on histological examination.
- Most of the mortality is related to the severe enterocolitis.

Pre-op.

- Large volume saline bowel washouts.
- Prophylaxis antibiotics.

Post-op. care.

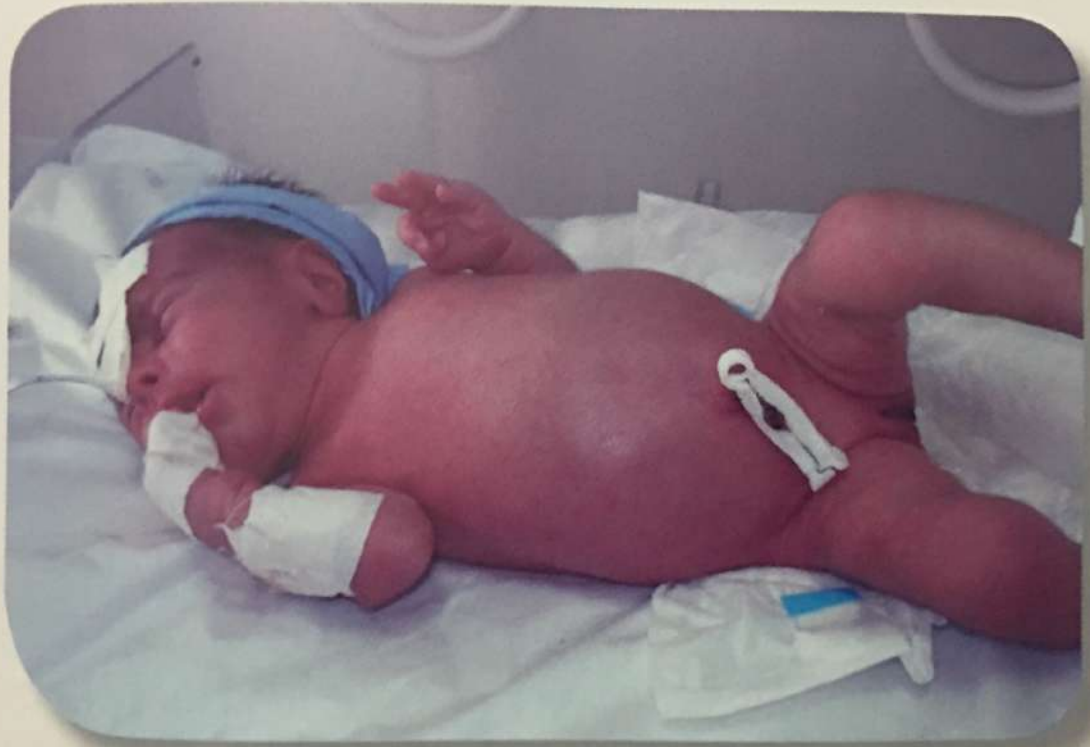
- I.V. fluids for 3-4 days.
- Check, labs,while the patient on full I.V.fluids.

Necrotizing Enterocolitis

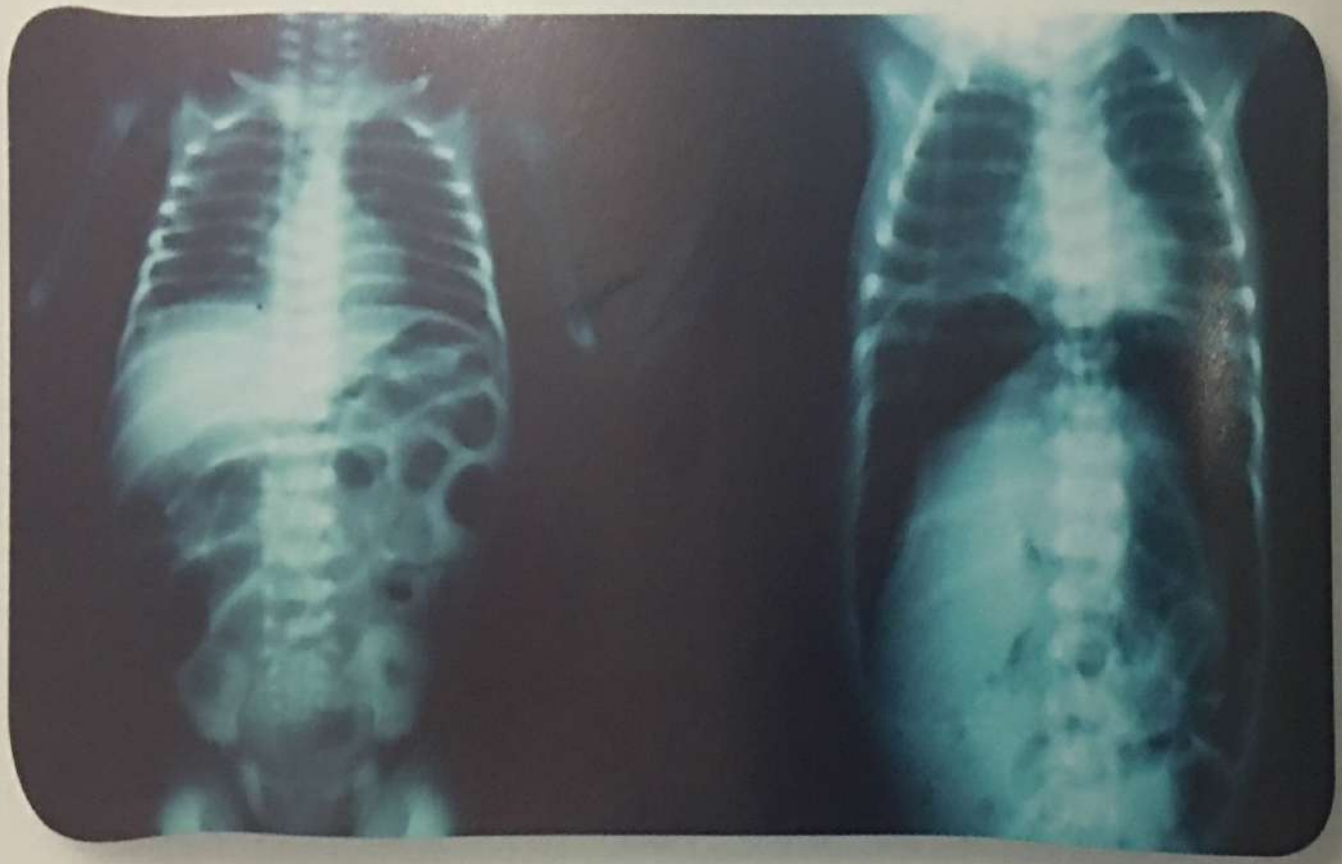
Incidence	3 / 1000 live births
Infants at risk	Premature
	Low- birth- weight
	Weight less than 1.5kg
	Exchange transfusion
	Congenital heart disease
Common site	Terminal ileum ,Colon
	Single or multiple
	Pan necrosis / entire intestine can be involved
Pathologic changes	Dilated bowel
	Fibrous exudates covering the serosal surface
	Patchy necrosis & haemorrhage
	Subserosal gas collections
	Mucosal ulcerations with epithelial sloughing
Histology	Coagulative necrosis of the mucosa
	Mucosal ulceration & intramural gas

Necrotizing Enterocolitis

Presentation	Abdominal distention Signs of sepsis(lethargic, apnea, bradycardia, unstable temperature, hypotention) In progress(abdominal wall oedema & erythematous, hematemesis & rectal bleeding)
Laboratory	Metabolic acidosis Lukopenia & thrombocytopenia
Plain film x-ray	Bowel distention, pneumatosis intestinalis, dilated intestinal loops, portal venous air, pneumoperitoneum & ascites
Progress	* Healing : by epithelization Or scarring & stricture formation * Perforation and peritonitis
Treatment	Conservative N/g decompression Tpn , Blood, I.V Fluid & antibiotics
Surgical Indication	**free air in the abdomen** **clinical deterioration(progressive acidosis)** **erythema of the abdominal wall** **fixed- loop sign & abdominal mass**



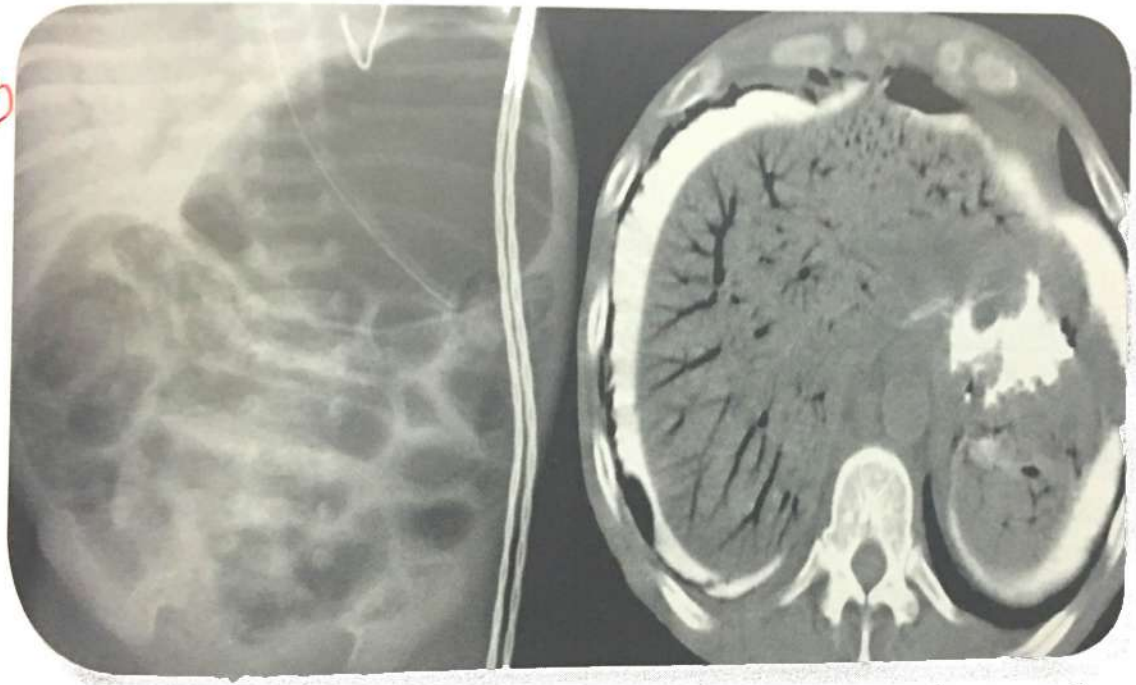
NEC, Baby (BW: 1900 g).



NEC

Intramural gas.
"Pneumatosis Intestinalis"

Free intraperitoneal air
"Pneumoperitonium"



"Portal Venous Gas"

CT- Scan , Shows the portal venous gas in the liver,
as well as gas in the spleen

Important Notes For The Resident

Necrotizing Entrocolitis

Diagnosis & Work-up.

- Common in premature infants.
  - May only have non-specific signs of sepsis.
  - Classically presents with abdominal distension and bilious vomiting.
  - May pass blood per-rectum. one cause for the GI bleeding in newborn along with anal fissure
  - FBC, U&Es, Coagulation screen and blood gases.
  - Plain abdomenal x-ray (erect & supine) for diagnosis & follow-up.

Management.

- General supportive care (may need to be ventilated).
- Stop all oral feeds.
- Ng/ tube and I.V. fluids.
- Blood products as necessary and consider the TPN.
- Broad spectrum antibiotics.

Surgery If indicated.

- Laporatomy and bowel resection.
- Laporatomy and stoma formation.

Anorectal Anomalies

Incidence
1/ 5,000 higher in male

Types
High deformities – Supralevator
- Recto- urinary fistula (male)
- Recto- vaginal fistula (female)

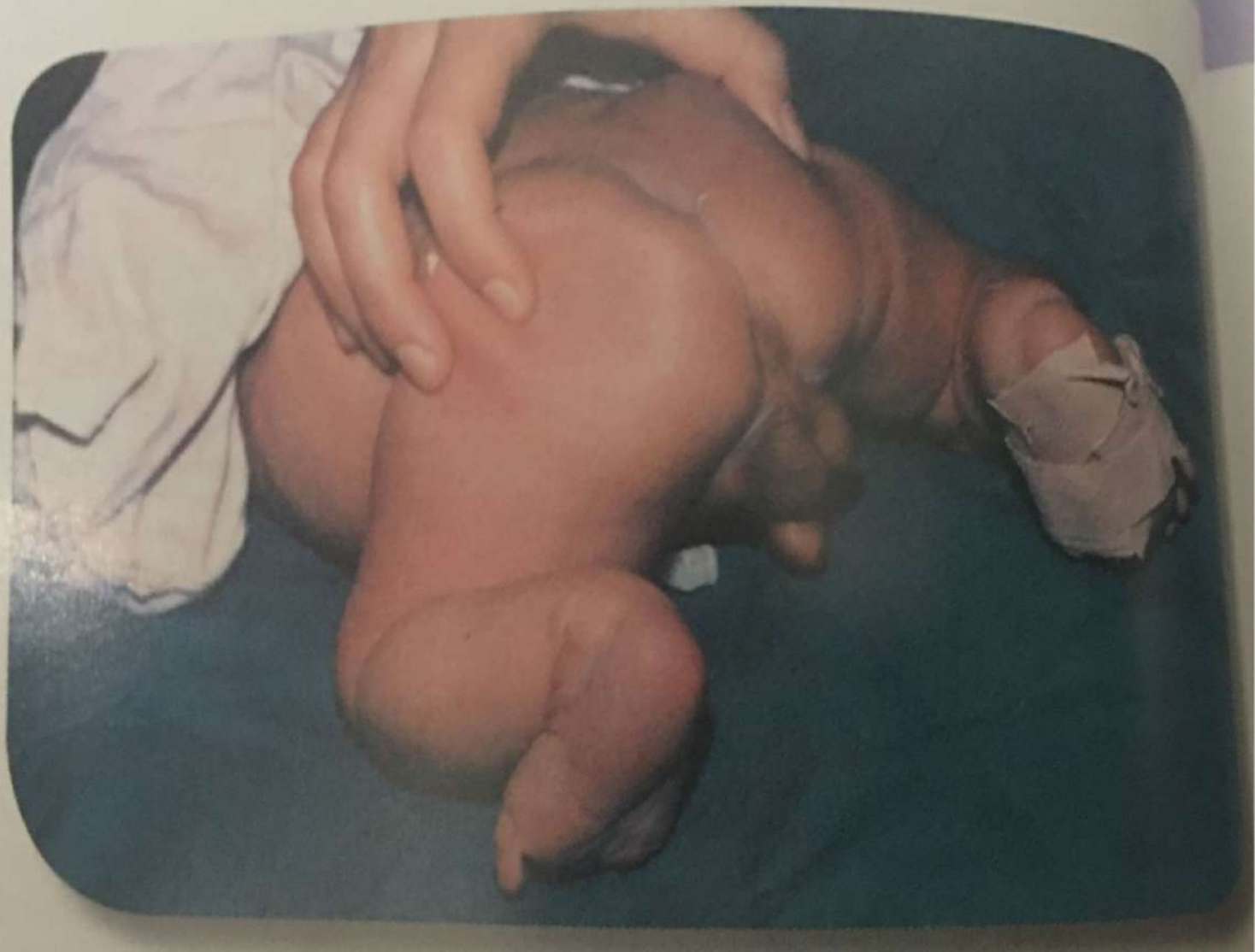
Low deformities – translevator
- Perineal fistula (male)
- Recto- vestibular fistula (female)

Presentation
- Recto- urinary fistula
- Recto- vaginal fistula
- Perineal fistula
- Intestinal obstruction

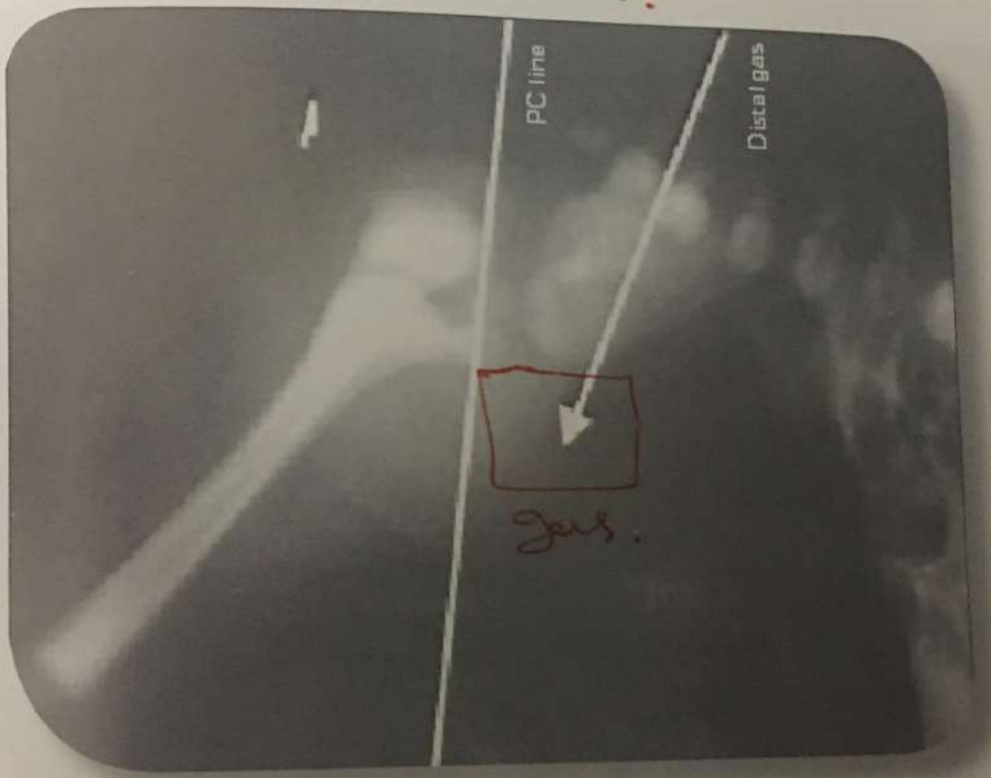
Associated malformation
(VACTERL), Down syndrome, Hirschsprung`s disease & duodenal atresia

Diagnosis
Perineal examination – observation up to 24 hrs
X-ray spine & pelvis, Micturating cysto- urethrogram, MRI

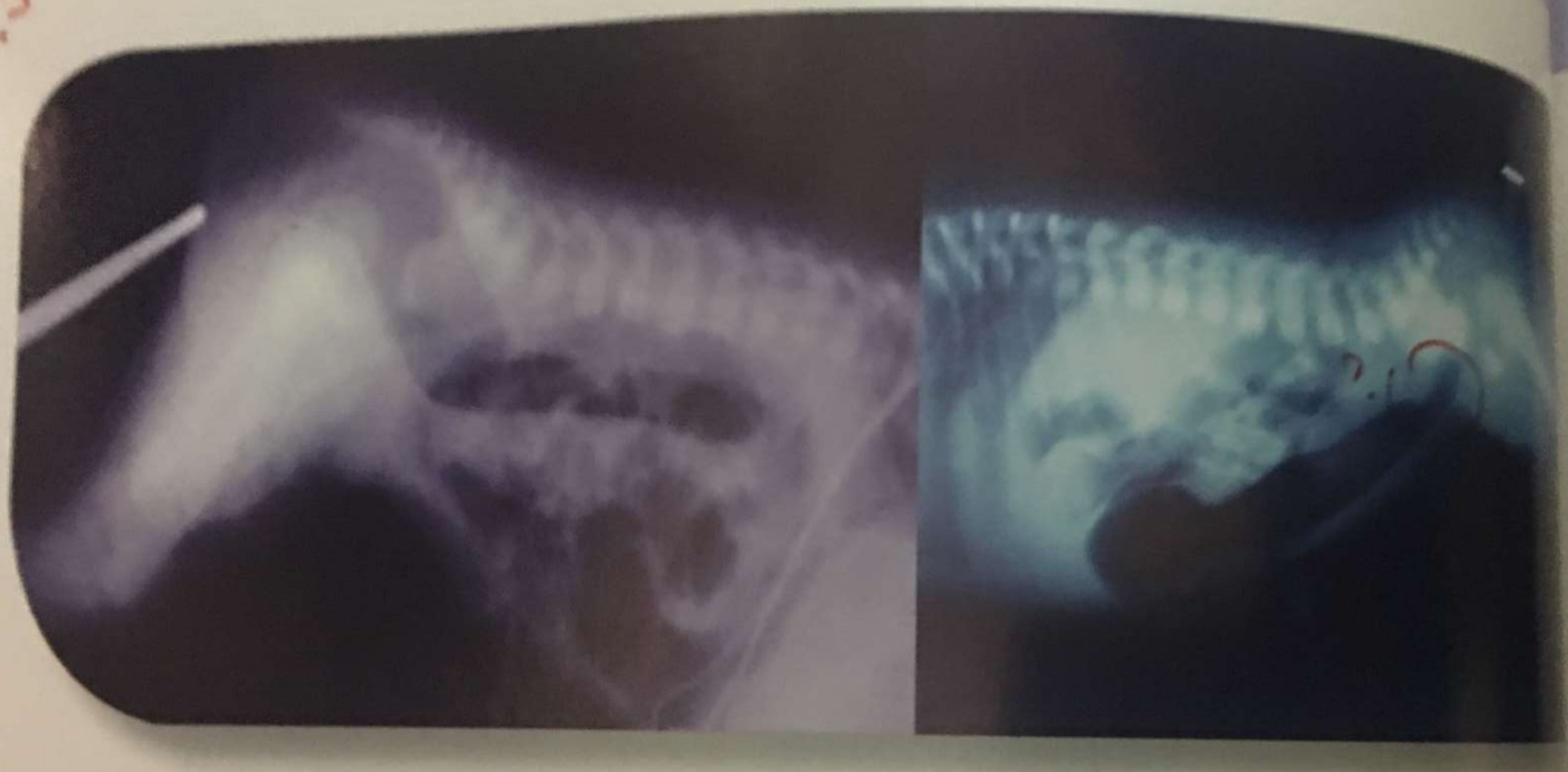
Treatment
Low defects **Perineal anoplasty**
High defects **Colostomy Followed by (PSARP)**



Imperforate Anus



Pronogram shows the relation of the PC line to the distal bowel gas

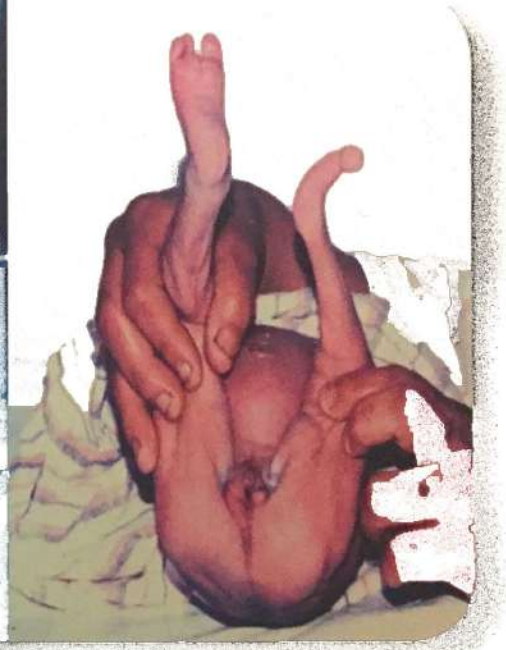


Pronogram X-ray

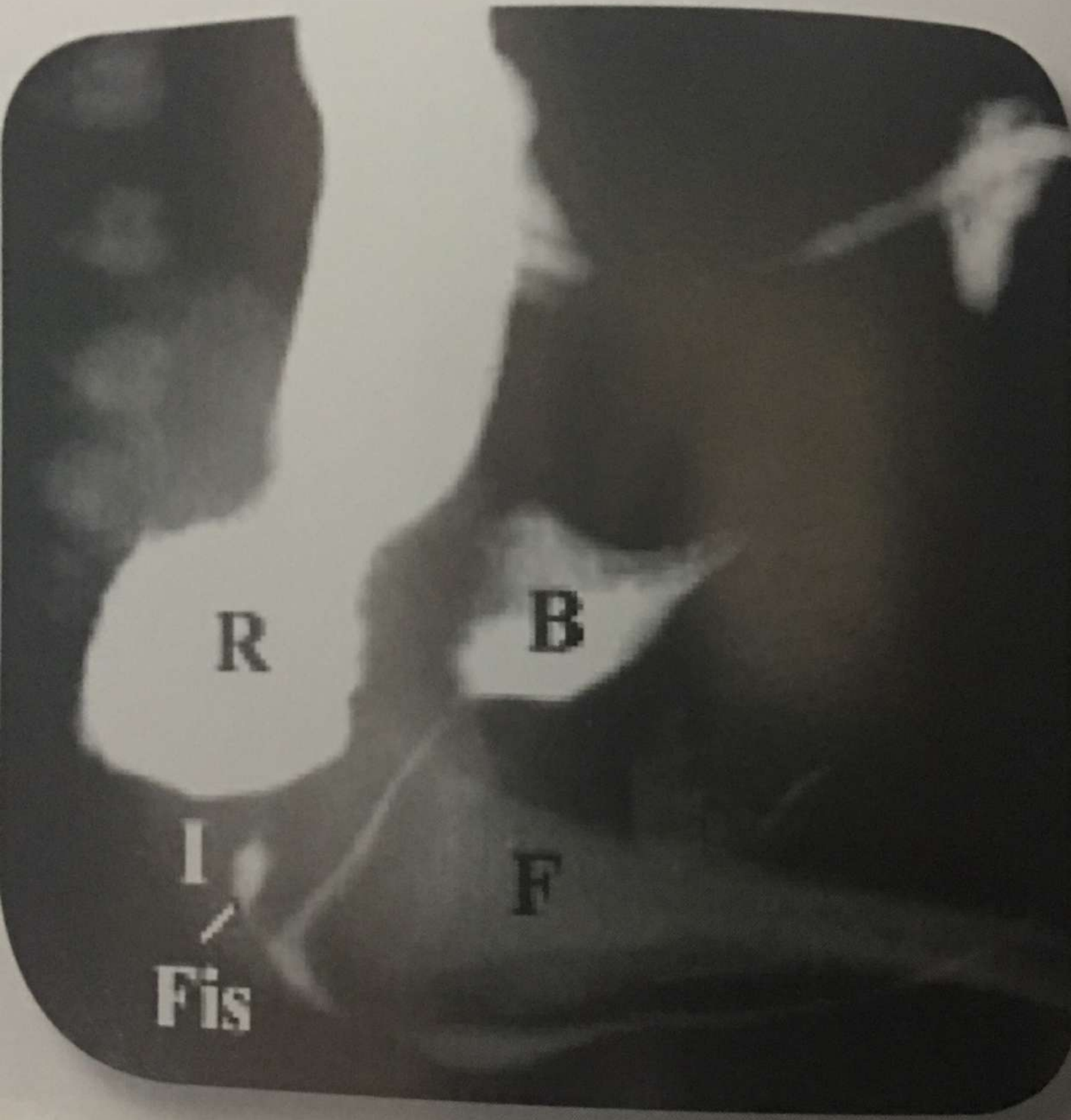
Low Type

High Type

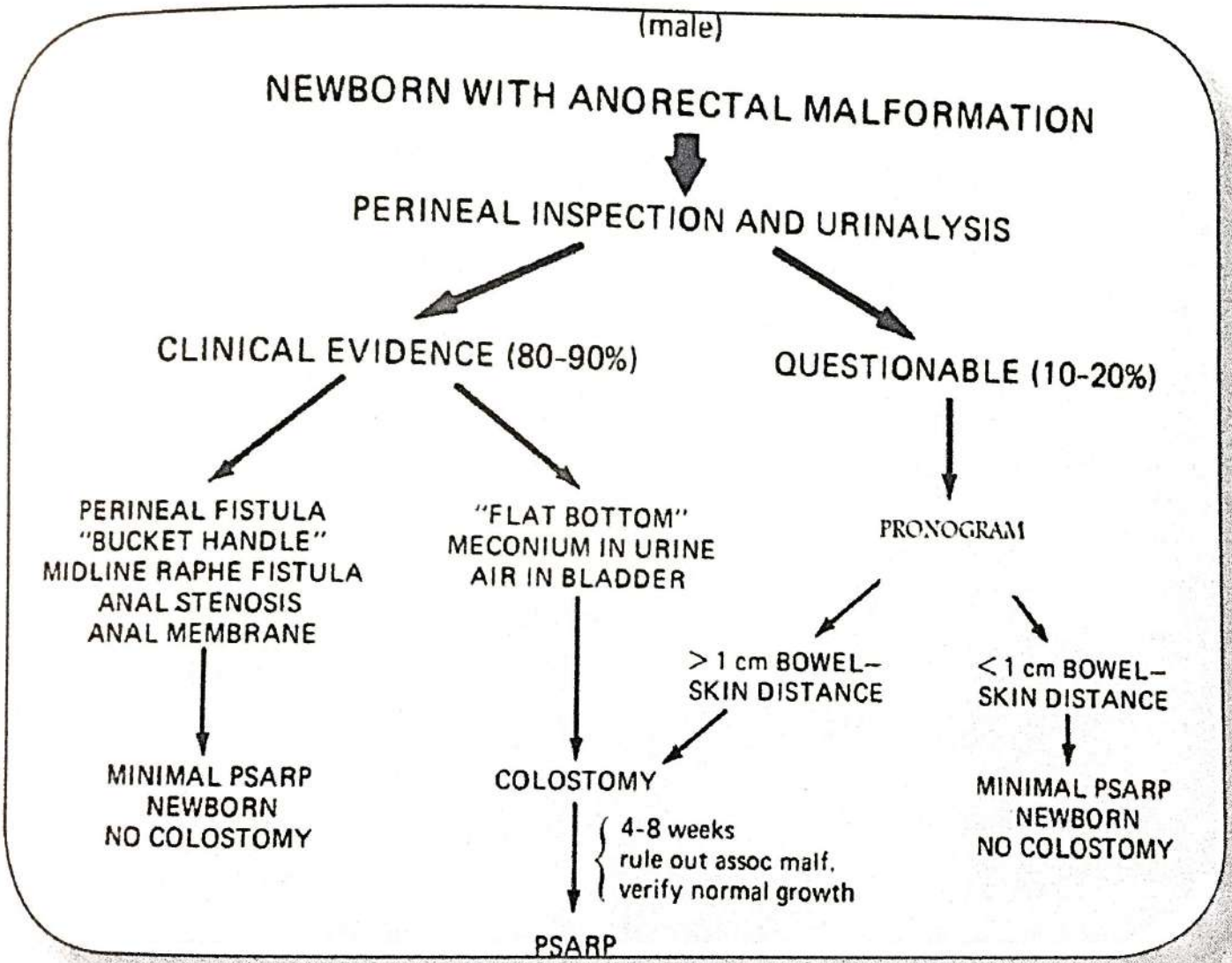
Bucket handle anomalies



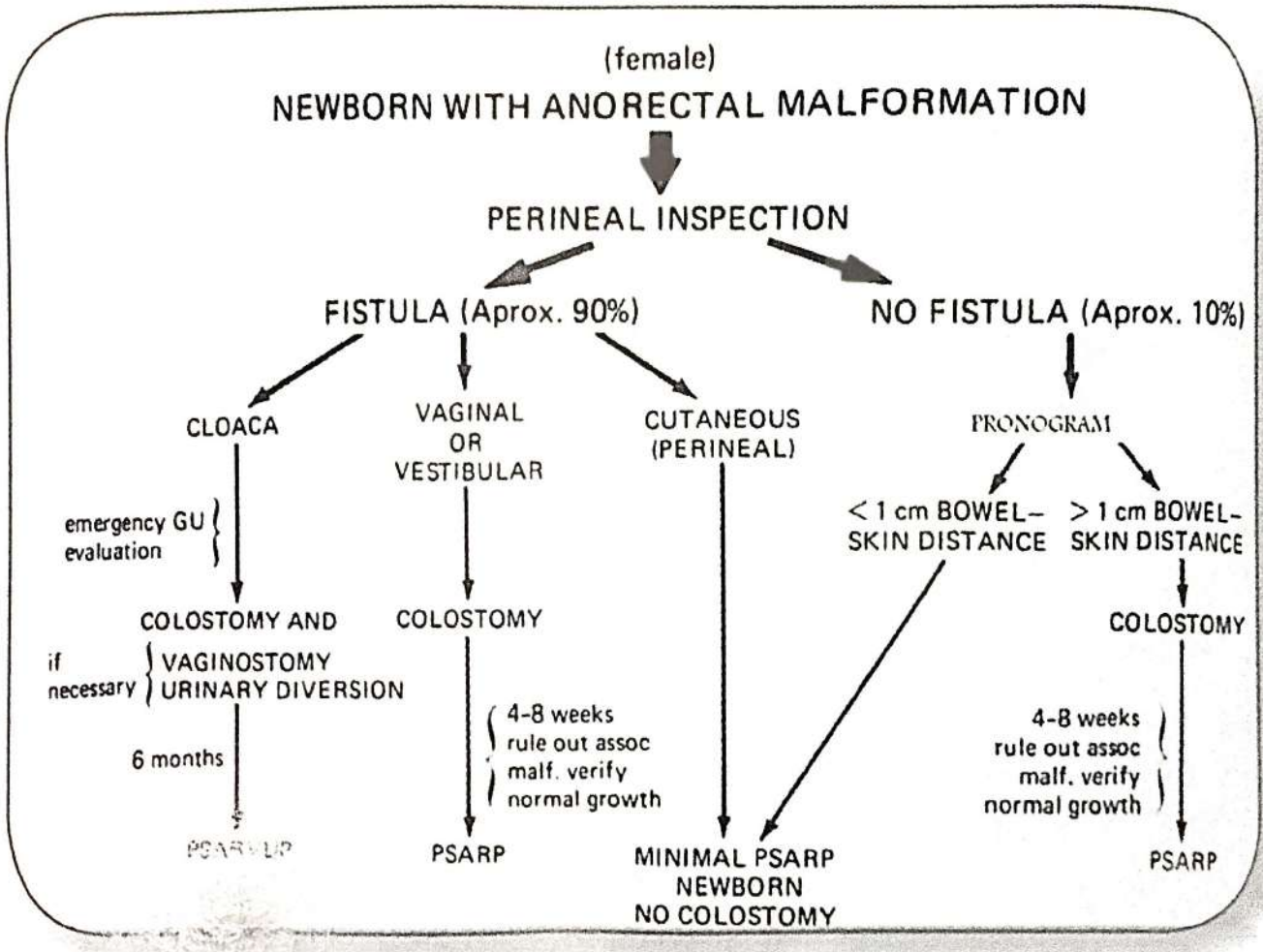
Imperforate Anus with associate anomalies



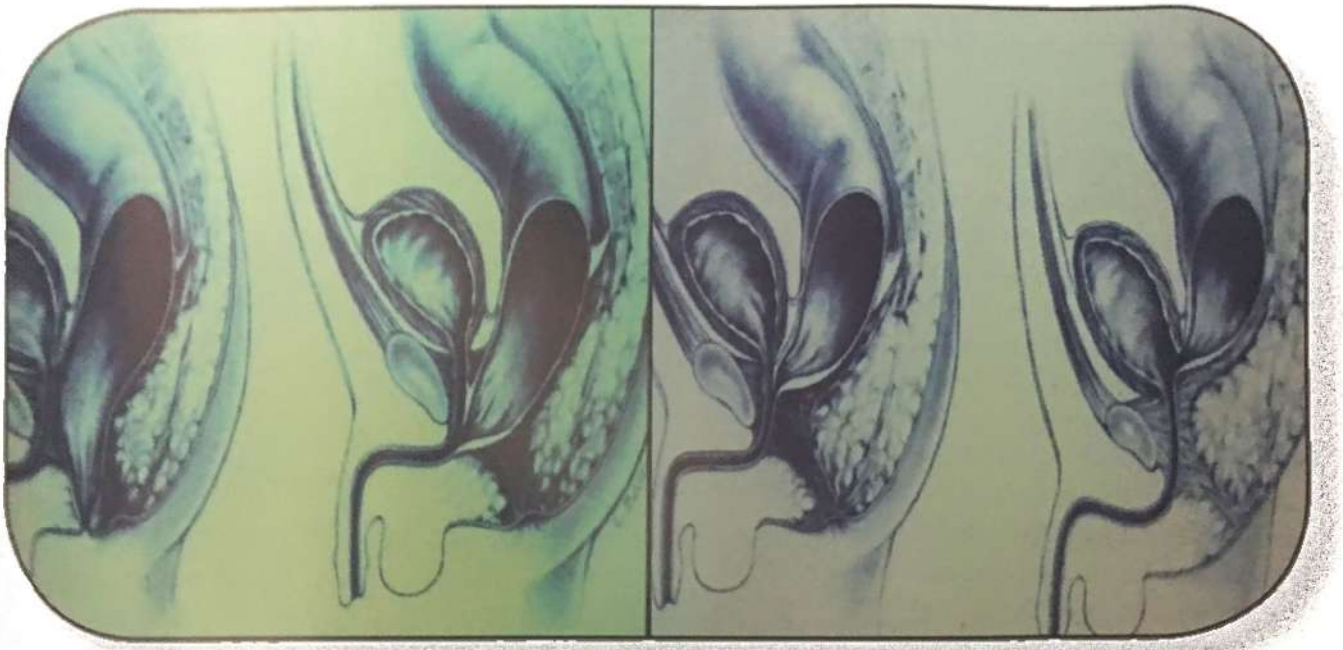
Recto – Urethral Fistula



lan for management the ano-rectal malformation in male (7)

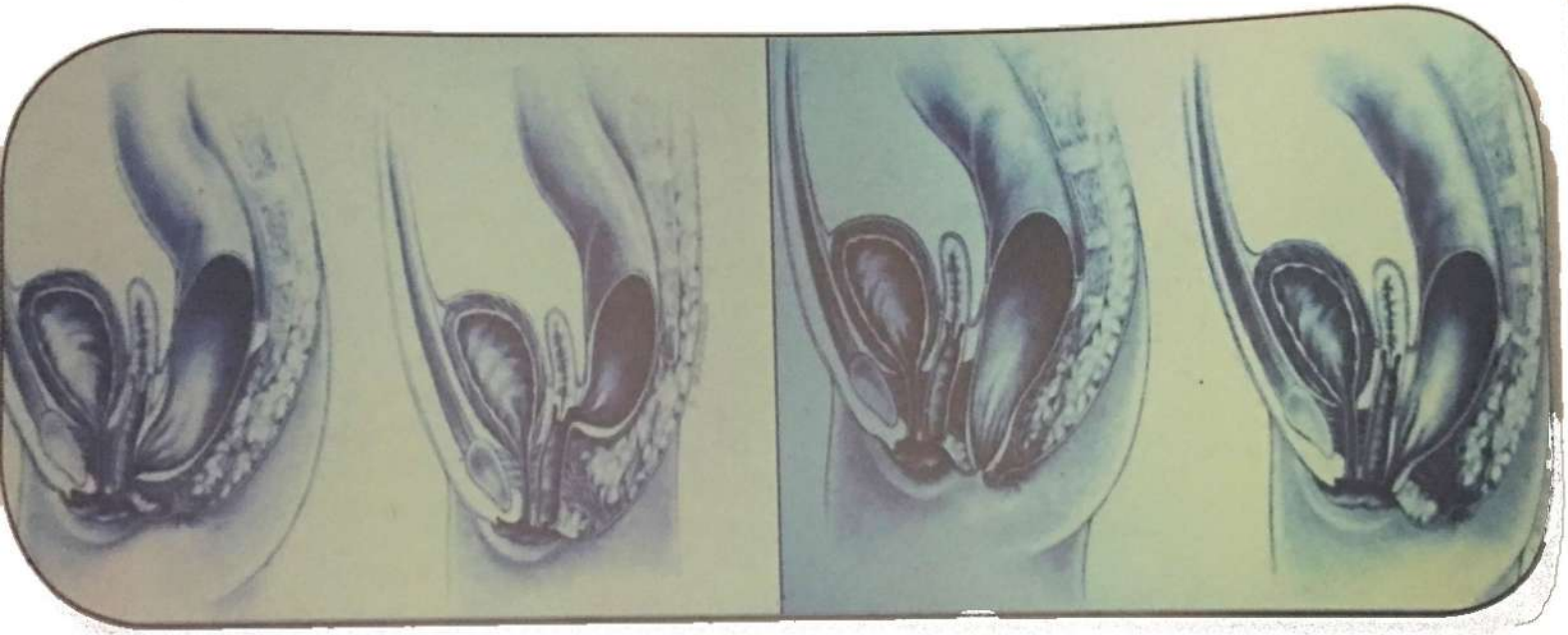


Plan for management the ano-rectal malformation in female (7



Recto-perineal. Recto- urethral , Recto-vesical Fistula

Male Ano-Rectal anomalies (7)



Recto-Vaginal Lower 3rd.--------Upper 3rd. Recto-Vestibular Fistula Common Cloacae

Female Ano-Rectal Anomalies (7)

Important Notes For The Resident

Imperforate Anus

- Consider the associated anomalies (VACTERL).
- Work- up pre-op in addition to usual labs.
- Renal ultrasound.
- Echocardiograph.
- Pronogram x-ray (at about 24 hrs.)
- X-ray spine.

Following the sigmoid defunctioning colostomy, one should consider the:

- Cystourthrogram.
- Loopogram.

Pre-op preparation.

- Ensure full work-up done.
- Antibiotic prophylaxis.

Post-op care.

- Ensure the usual post-op care.
- Continue antibiotics, start oral Trimethoprim once feeding ok.
- Consider the need PSARP and closure colostomy at later dates.

Oesophageal Malformation

Oesophageal atresia

Complete interruption of the lumen
Blind upper pouch
With or with out tracheo – oesophageal fistula

Incidence — 1/ 3000 – 4000 live births

Associate anomalies — VATER & VACTERL

Vertebral, Anal, Cardiac, Tracheo-oesophageal , Renal & Long bone.

Effect of oesophageal atresia

Accumulates of the saliva in the upper pouch
Spills over in to the trachea
Aspiration of gastric contents
Pulmonary complication
Abdominal distension (air through fistula)

Early diagnosis — The chance of successful surgical treatment
prevent the pulmonary complications

Oesophageal atresia

- Affects 1 in 3000 live births
- Aetiology is unknown but incidence is increased in first degree relatives
- Often associated with a trachea-oesophageal fistula (TOF)
- Various presentations include:
- Oesophageal atresia with TOF - 87%
- Isolated oesophageal atresia - 8%
- Isolated TOF - 4%
- Oesophageal atresia with proximal and distal TOF
- 50% of patients have other congenital abnormalities Usually involving the cardiovascular, urogenital or anorectal systems

Clinical features

Prenatally

- Diagnosed by the finding of polyhydramnios.
- Stomach is empty on ultrasound.

Postnatally

- Diagnosed by the neonate drooling or unable to swallow
- Cyanosed during feeding
- Develop aspiration pneumonia
- Perform a careful physical examination to document and exclude other associated developmental anomalies.
- In the presence of a TOF, abdominal distention may occur due to collection of the air in the stomach
- A 10 Fr, naso-gastric tube can not be passed more than 10 cm
- On chest –abdomen x-ray if there is gas in the stomach, mean there is a distal TOF.

Oesophageal Malformations

Diagnosis

Maternal hydromnios – Present in 60%

Oesophageal Catheter – arrested about 10cm.from lips

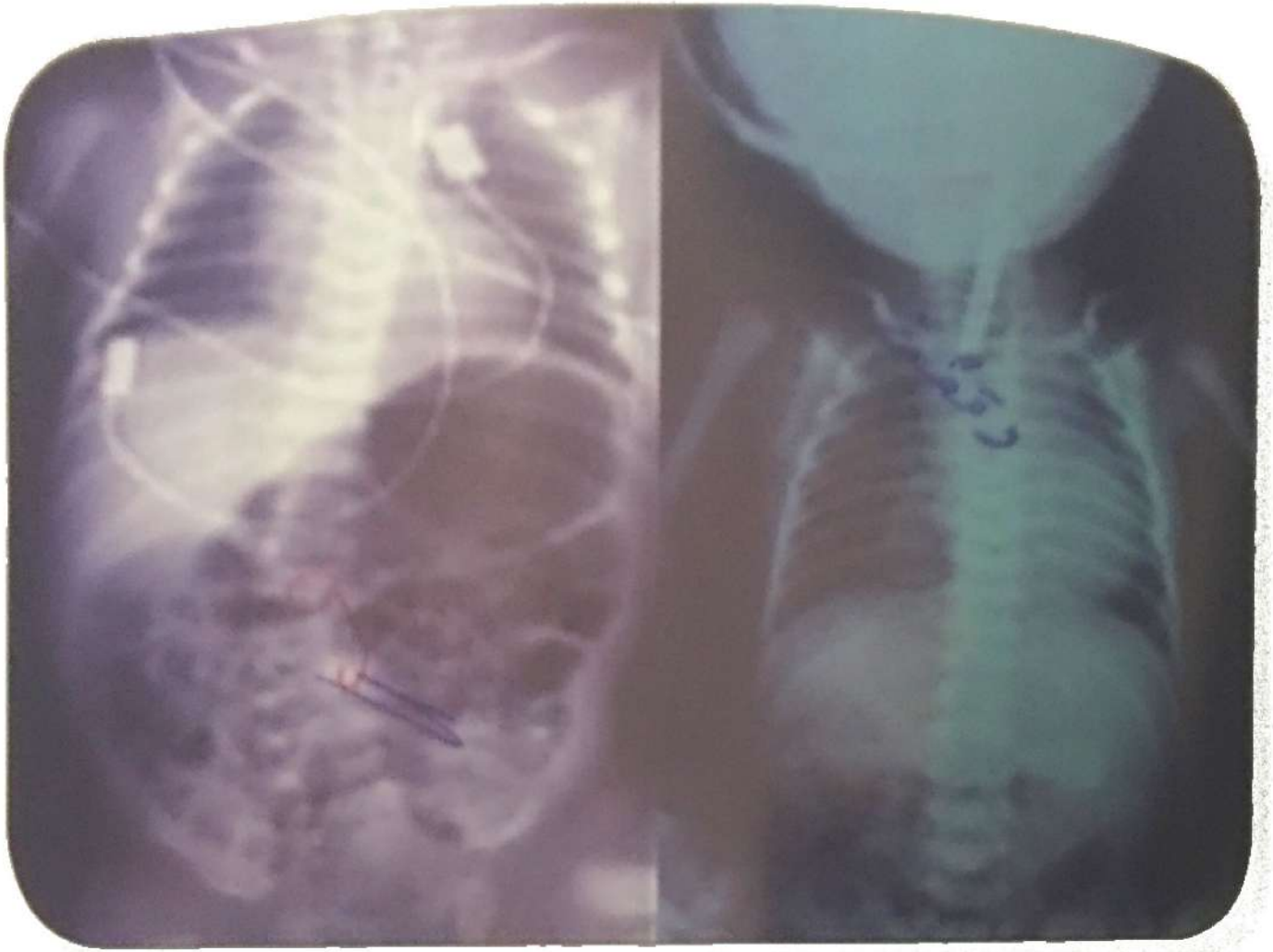
Symptom

Rattling respiration
Excessive salivation
Fine frothy white bubbles of mucus at the nostrils&lips
Feeding cause choking
Acute episode of spluttering
Coughing and cyanosis
Regurgitation & aspiration of milk

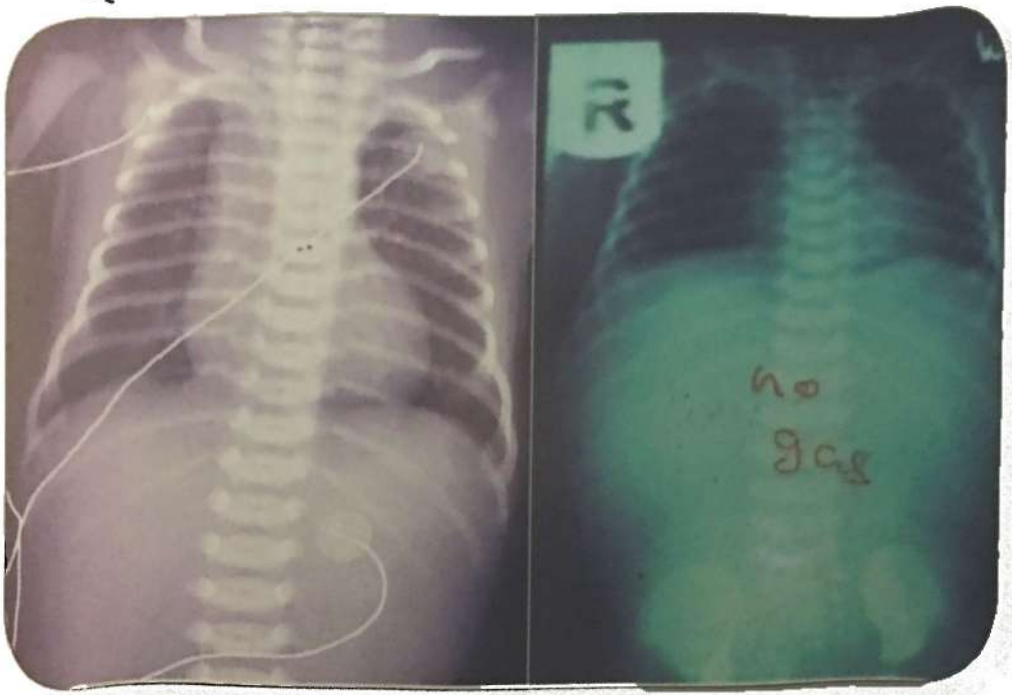
X – ray thorax
& abdomen to confirm the :

Upper pouch – Catheter (Radio – Opaque)
State of the lung or other abnormalities
Presence of air in the stomach

if there is fistula with trachea.



Oesophageal Atresia with T.O.F. the upper pouch visualized by Ng/ tube.



Oesophageal Atresia with out fistula,
shows the catheter in the proximal pouch and no air in the bowel.

preoperative

The risk of aspiration should be reduced.

- Continuous suctioning of the blind oesophageal pouch with an 8F catheter may decrease the risk of aspiration.
- The infant's head should be elevated, and he or she should be hydrated
- provide intravenous fluid solution.
- If the patient develops acute respiratory failure, endotracheal intubation and mechanical ventilation are performed.
- Administer broad-spectrum antibiotics for patients who may have developed lower respiratory tract infection.

Oesophageal Malformations

Tracheo – oesophageal fistula with out atresia (H- fistula)

- Very uncommon
- At the level of C7 or T1

Presentation

- Episode of choking and coughing, during feeding
- Cyanosis with pulmonary complication
- Frequent pulmonary infections
- Air passes freely in to the stomach (abdominal distention)
- Acid passes freely as result of this distention and lax cardia in to the trachea and bronchus causes peptic pneumonitis

Diagnosis

- By contrast cine – radiography

Treatment

- Division of the fistula
- Via cervical approach or Via Thorcoscopy.

Oesophageal Malformations

Treatment	
Preparation for Surgery	Incubator Care Antibiotic I.V Fluid Upper pouch Suction
Operation	Rt. Posterolateral extra pleural thoracotomy Fistula – divided and closed Direct anastomosis
Alternative	Gastrostomy for feeding Cervical Oesophagostomy

in case of pneumonia, or the kid is ill.

Oesophageal Malformations

Treatment

For a patient unfit for early anastomosis such as ..
Prematurity
Associate anomalies
Pneumonia
Poor general condition

Actions

Gastrostomy to prevent reflux & for feeding
Continuous aspiration of the upper pouch to prevent spill- over in to the bronchial tree.
Close the fistula

Prognosis

In full term baby with a good condition
If the diagnosis early with no abnormalities
The survival rate is 98%

Oesophageal Malformations

Complications

1- Brassy Cough — not uncommon, may persist for 12 – 18 months disappears spontaneously when the tracheal growth

2- Oesophageal Stricture — 50% for oesophagoscopy and dilatation

3- Break down of the anastomosis
   Partial – develop fistula treated by I.V feeding with out gastrostomy
   Complete – treated by – reoperation with or with out gastrostomy.

4- Recurrence of the tracheo – oesophageal fistula

Causes of death

- Pulmonary Complication
- Prematurity
- Associated anomalies

Important Notes For The Resident

Oesophageal Atresia

Diagnosis and worl-up

- Consider associated anomalies VACTERL.
- AP & lateral CXR with radio-opaque tube held in oesophagus.
- Renal ultrasound.
- Echocardiograph.
- X-ray spine.

Pre-op.preparation

- Sump (Replogle) tube for continous suction.
- Elevate the baby head slightly.
- commence i.v. fluids.
- Ensure full work-up done.
- Antibiotics prophylaxis.

Post-op care.

→ kept on ventilation

- Continue antibiotics.
- Chest tube can be remove after 5 days.
- Contrast swallow at 7 days post-op.

Diaphragmatic Hernia

Embryology

Abnormality is due to developmental disturbances

- The septum transversum form the anterior central tendon
- The pleuroperitoneal membranes form the dorsolateral portions.
- The oesophageal mesentery forms the dorsal crura
- The thoracic intercostal muscle groups form the peripheral muscular portion of the diaphragm

Congenital diaphragmatic hernia

- Occurs in 1 in 2000 - 4000 live births
- Results from failure of closure of the pleuro-peritoneal canals
- 95% occur through the posterior foramen of Bochdalek
- Less than 5% occur through the anterior foramen of Morgagni
- The bowel loops herniated through this defect into the chest, impairing lung development.

Associated conditions seen with Congenital Diaphragmatic hernia

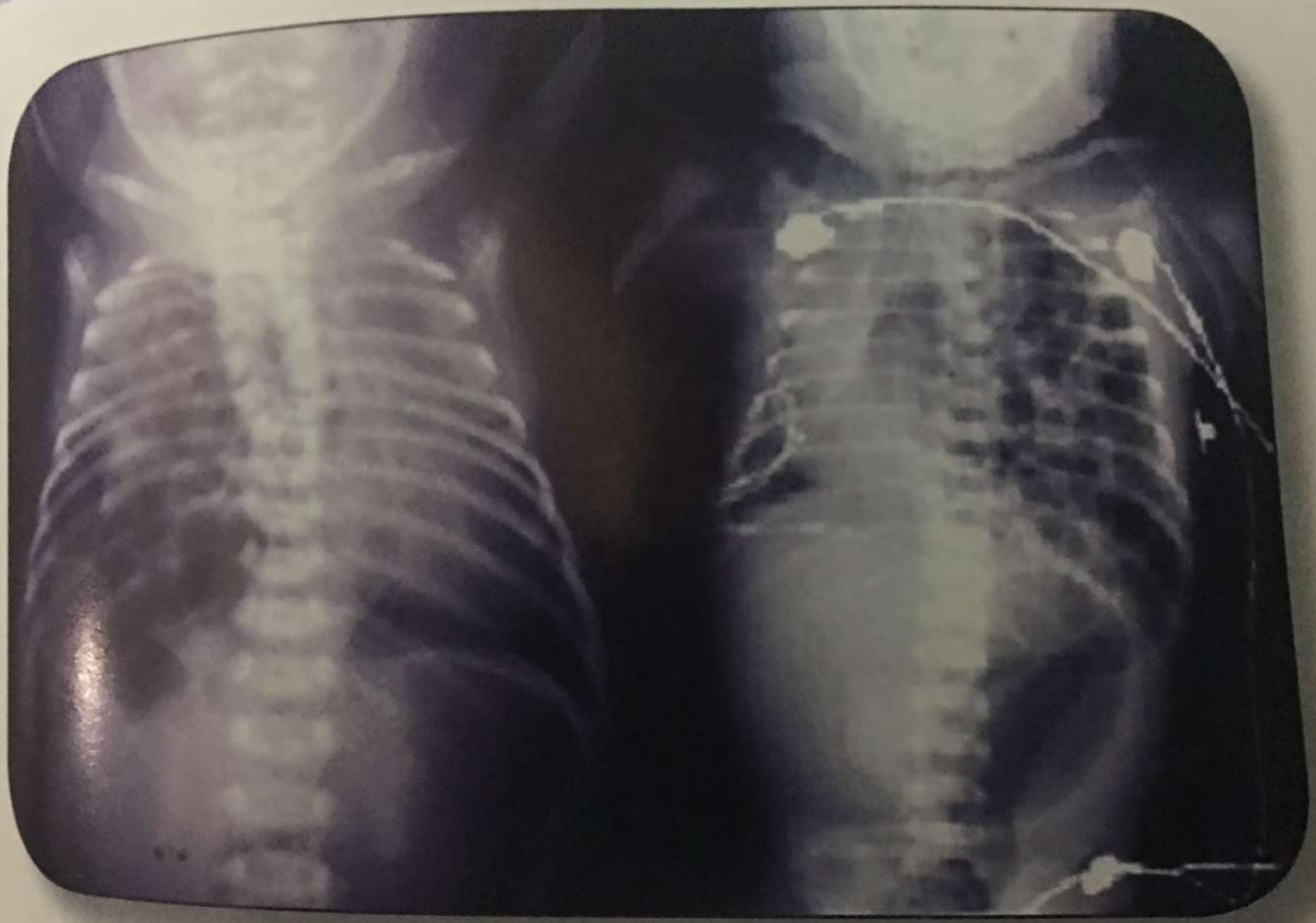
- Malrotation
- CNS defects (spina bifida, hydrocephalus, cerebral dysgenesis)
- Cardiovascular defects (ASD, VSD, coarctation of aorta, TOF)
- Chromosomal disorders (Trisomy 18 and 21)

Clinical features

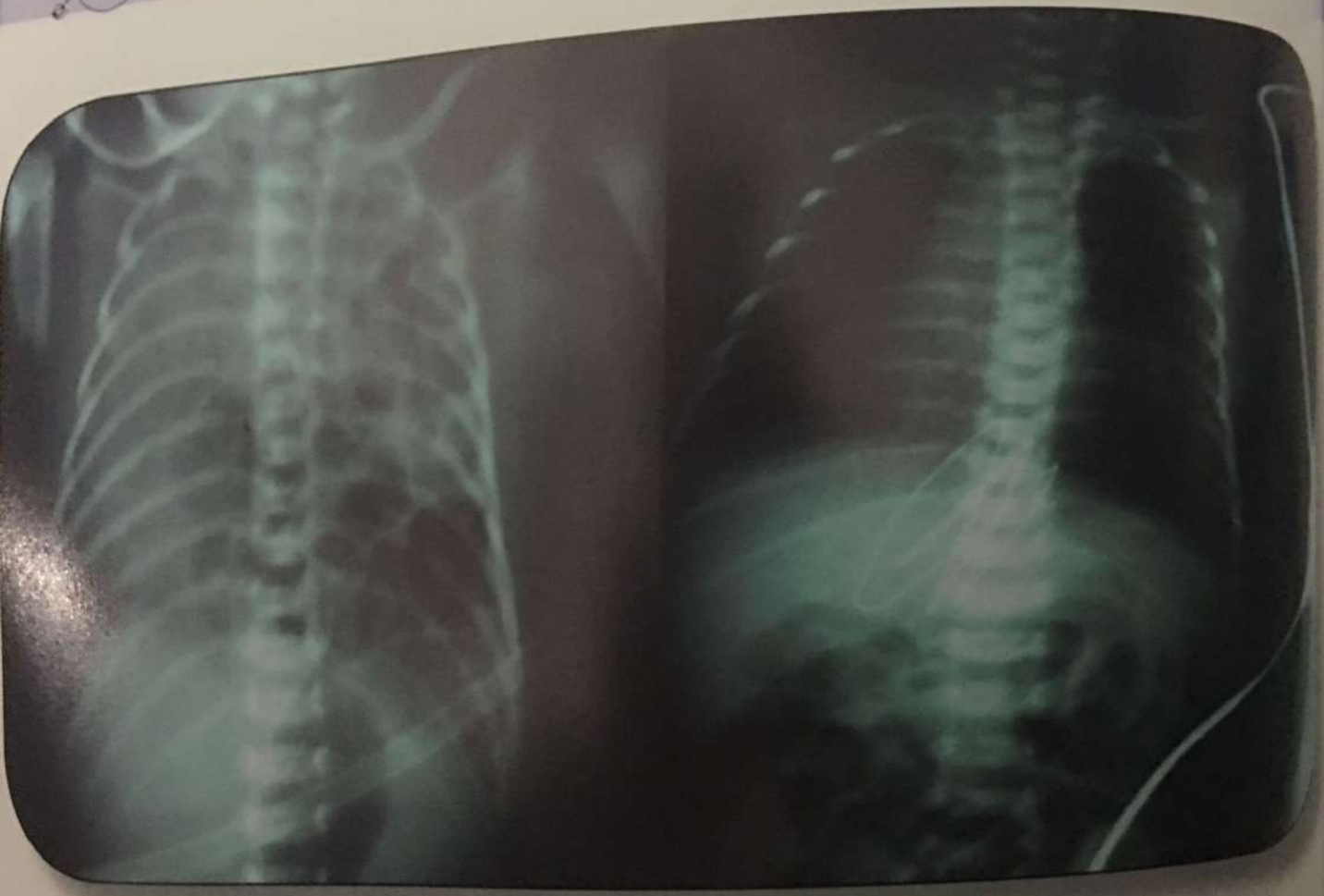
- May be diagnosed on antenatal ultrasound
- Often presents with cyanosis and respiratory distress soon after birth
- Prognosis is related to the time of onset and degree of respiratory impairment
- Examination shows the abdomen is flat
- Air entry is reduced on the affected side
- Heart sounds are often displaced
- Chest x-ray will confirm the presence of gastrointestinal loops in the chest
- Occasionally presents with intestinal obstruction later in life

Clinical and Physical features

- Obvious respiratory distress:
  - Cyanosis, dyspnoea,tachypnoea
- Vomiting may be due to:
  - Underlying complication of malrotation
  - Strangulated diaphragmatic hernia
  - Morgagni type hernia
- Decreased movement of the affected side
- Scaphoid abdomen.
- Shift of the apex beat.
- Apparent dextrocardia.
- Intestinal gurgling sound in the chest at the affected side.
- Breath sounds are absent or diminished on affected side

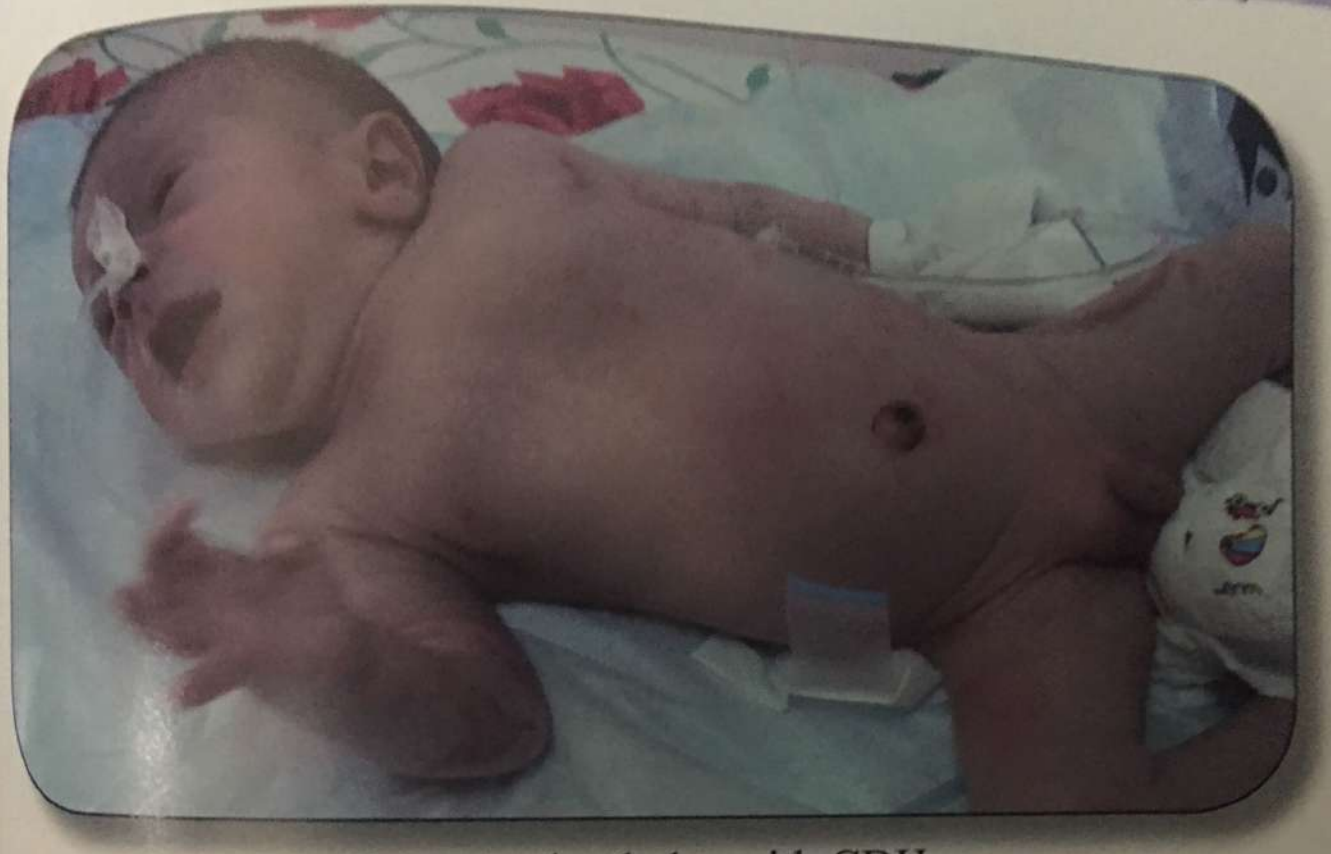


RDH LDH

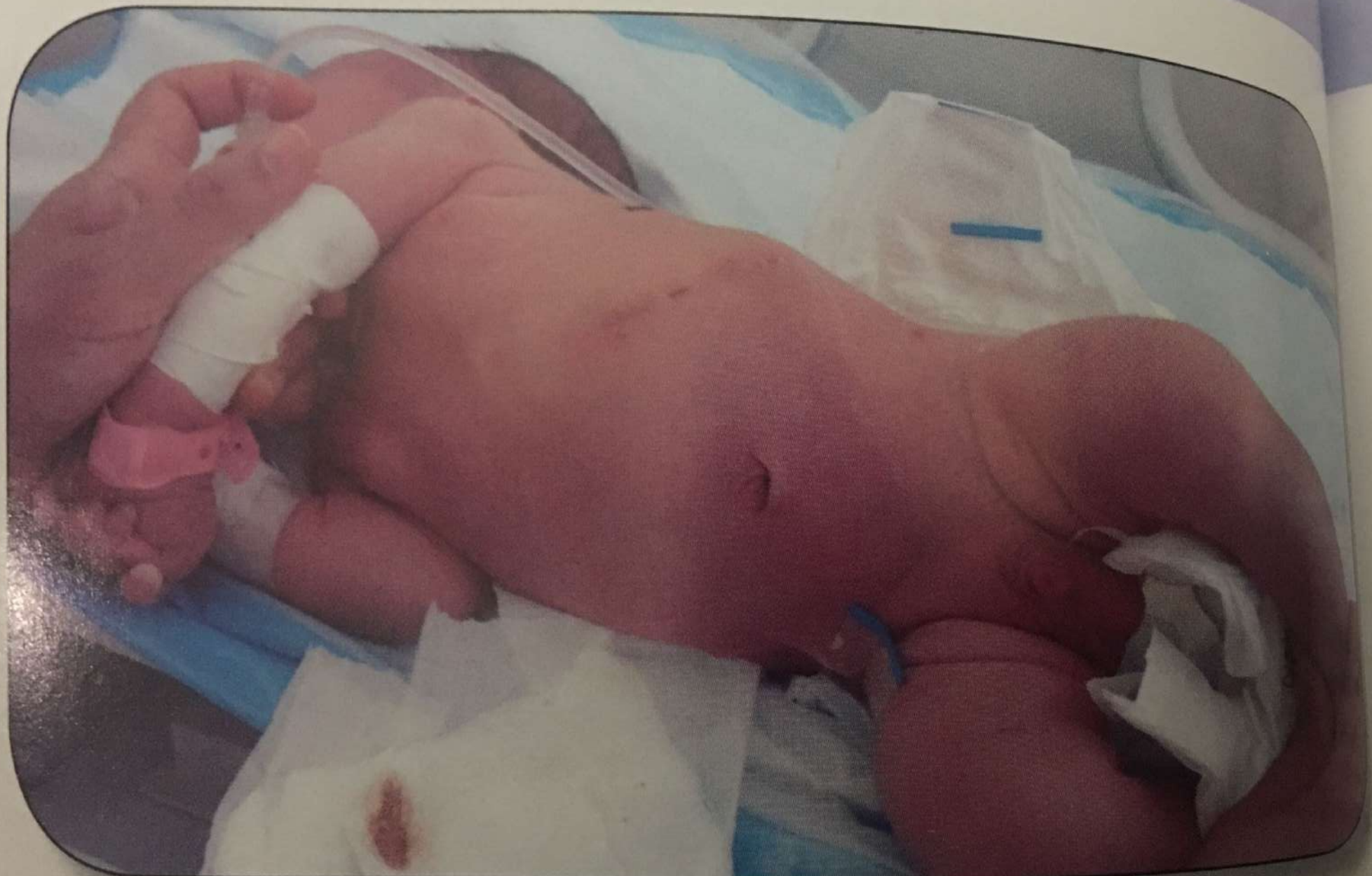


Pre operative X- ray

Post operative X-ray



Preoperative baby with CDH



Post operative with sub costal scar

The congenital defects in the diaphragm

- **Incidence:**
  - 1/ 2000 – 4000 live births.
  - 8% of infants with CDH are stillborn.
  - 80% occur on left side
  - 19% on the right side
  - 1% are bilateral
  - 2% are of Morgagni type
- **Bochdalek hernia:**
  - A posterolateral defect
  - The most common type of CDH.
  - Ranges from a small defect to almost complete agenesis.
- **Morgagni hernia:**
  - An anteromedial defect
  - Approximately 20 times less common.
- **Diaphragmatic eventration:**
  - A central weakening of the diaphragm

Management

- Respiratory support with intubation and ventilation is usually required.
- A nasogastric tube should be passed.
- Gas exchange and acid-base status should be assessed.
- Acidosis may need correction with bicarbonate infusion.
- Surgery should be considered early after resuscitation.
- Hernial content are usually reduced via and abdominal approach.
- The diaphragm repaired with nonabsorbable suture or a synthetic patch if the defect is too large.
- Early respiratory failure is associated with a poor prognosis.

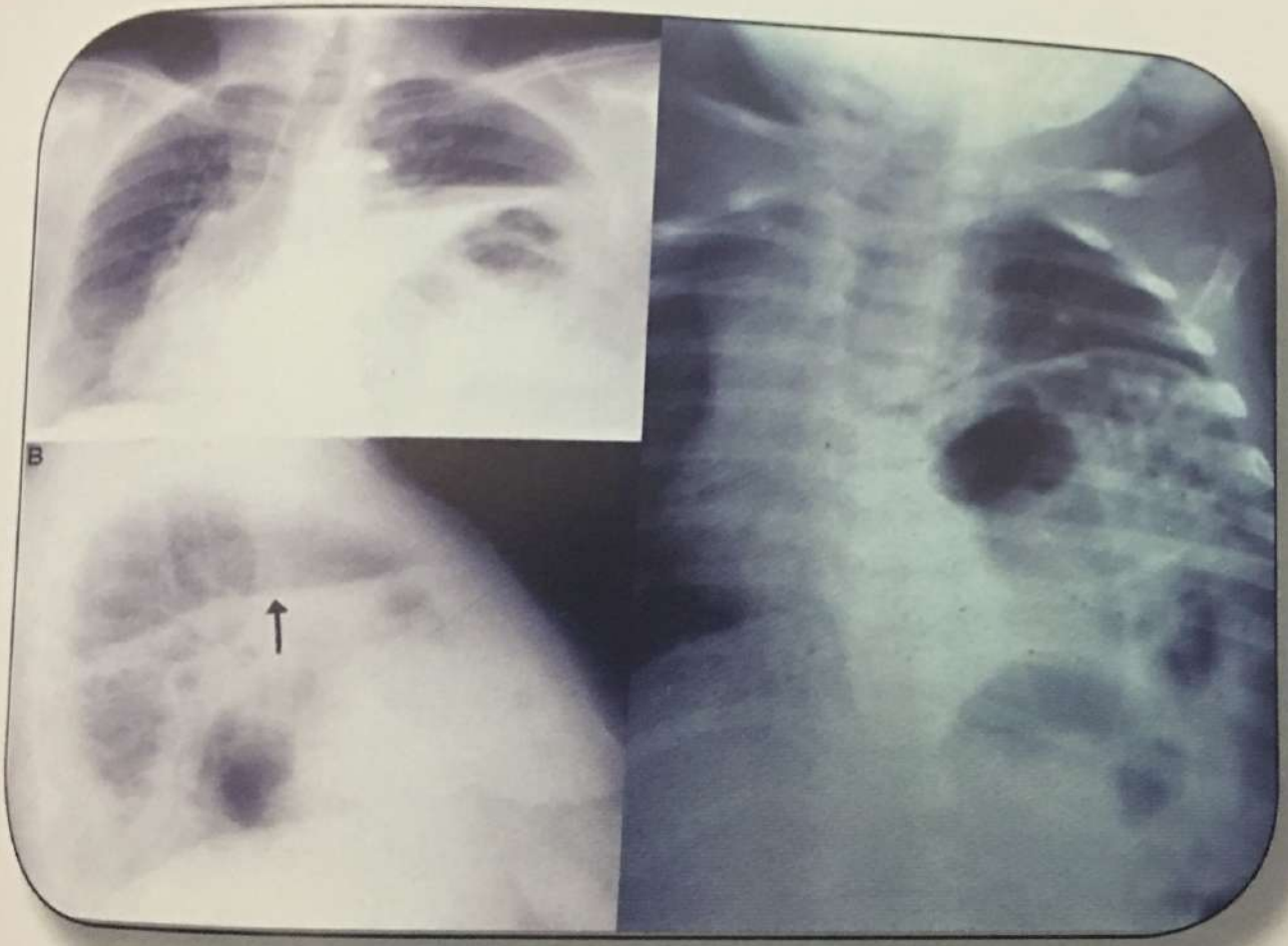
Important Notes For The Resident

Diaphragmatic Hernia

- The earlier the presentation the poorer the prognosis.
- Can be diagnosed antenatally.
- Most of the cases present with respiratory distress at birth.
- All should have large bore Ng- tube in to stomach to decompress.
- Principle of gentle ventilation is essential.
- Careful pre- op stabilization.
  - Blood gases.
  - Echocardiogram.
- Surgery is done through a subcostal approach.
- Reduction of the herniated bowel and repair the defect.
- Use of synthetic sheets if the defect is large.
- The infant should be kept paralyzed and ventilated.
- Should be weaned in a very slowly from the ventilator.
- The mortality is directly related to the degree of lung hypoplasia and its associated pulmonary hypertension.

Eventration of the diaphragm
(Abnormal elevation of the diaphragm)

Congenital	Muscularization abnormality
Acquired	Lack of diaphragmatic innervation Secondary to phrenic nerve damage
Diagnosis	Fluoroscopy, to demonstrate the paradoxic movement of the diaphragm
Treatment	Repair is necessary if respiratory distress. When a functional deficit. To ensure maximal development of the lungs. The diaphragm to be plicated with non - absorbable sutures



Eventration of the diaphragm

Morgagni Hernia

- The defect is through the foramen of Morgagni.
- The defect is situated anteriorly (where the internal mammary and Epigastric vessels traverse the diaphragm.
- Uncommon and rarely symptomatic in neonates

Presentation

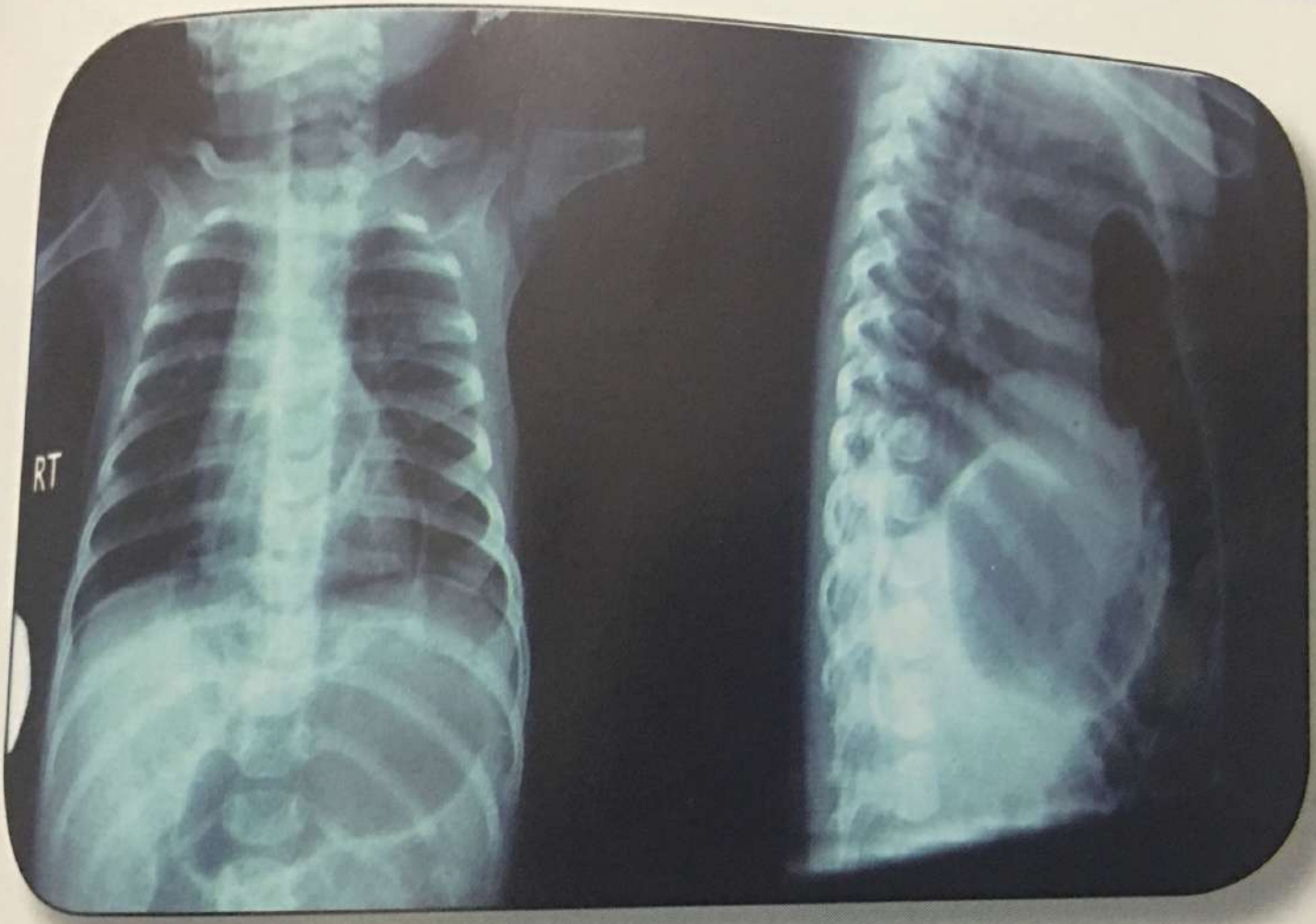
- An incidental finding of mass or air – fluid level on chest X – ray

Symptoms

- Episodic coughing
- Choking
- Vomiting

Associated anomalies

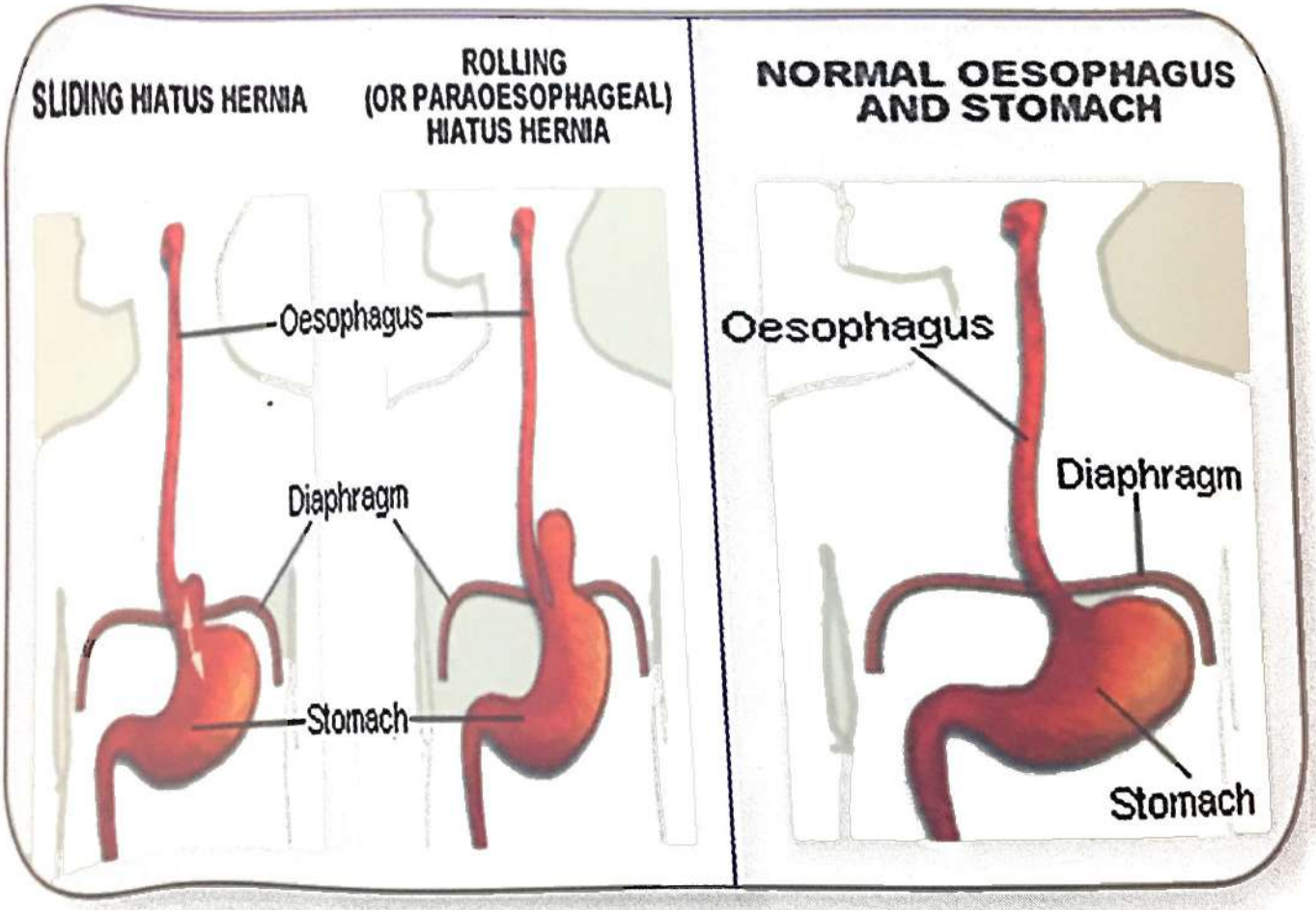
- Ectopia cordis
- Midline abdominal defect
- Omphalocele
- Pericardial defect and cardiac anomaly



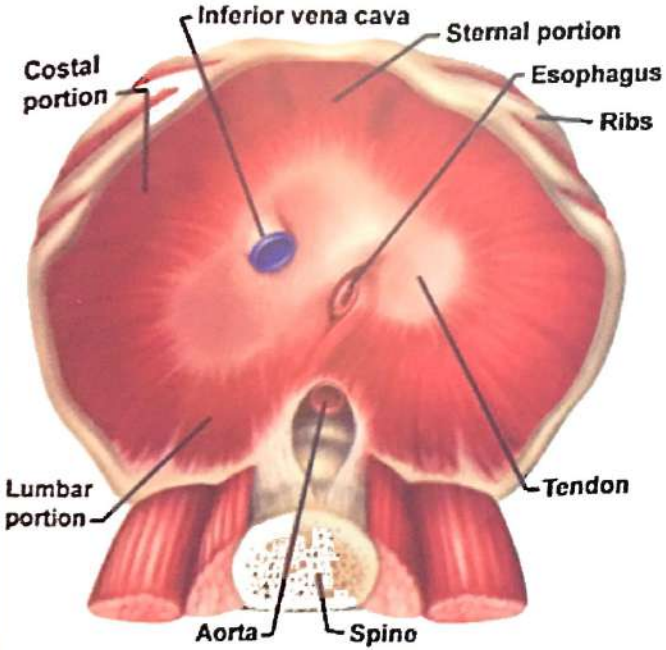
AP -View

Lateral View

Morgagni Hernia X-ray



Hiatus Hernia:(a part of the stomach protrudes through the Oesophageal hiatus of the diaphragm in to the chest (14)



Anatomy of the Diaphragm (14)

Competence of the cardia

Depend on

- Pinchcock – like action of the diaphragm, produced by the winding of the right crus around the oesophagus.
- The rosette formed by the Longitudinal fold of the lower oesophageal mucosa, enhances the effect of weak muscular contraction at this point.
- The oblique entrance of the oesophagus in to the cardia forming the acute angle of His.
- The closing of the distal oesophagus by positive intra- abdominal pressure.

Hiatus Hernia

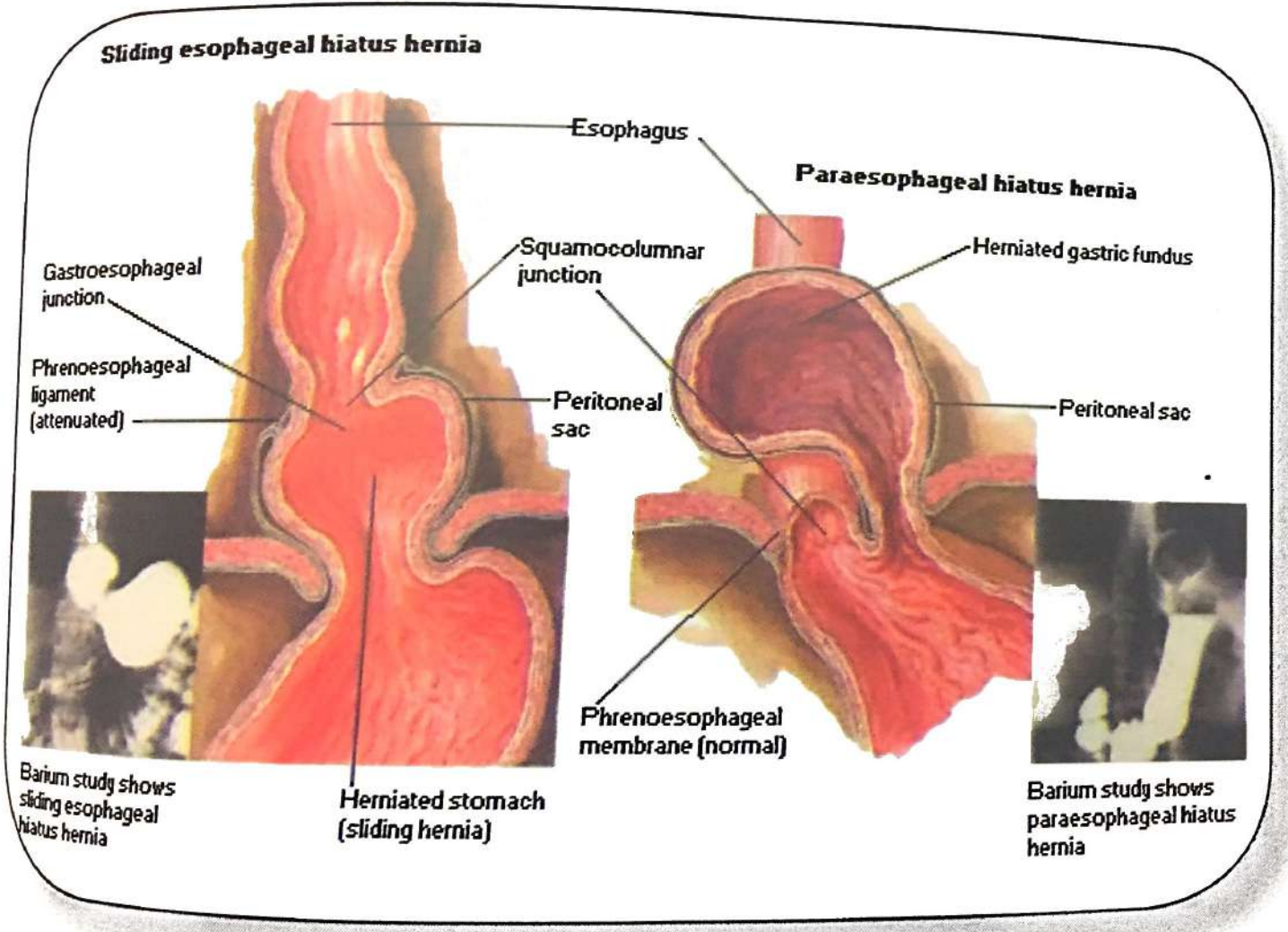
Sliding hernia

Clinical presentation :
- **Vomiting**
  - gastro- oesophageal reflux
  - peptic oesophagitis
  - anaemia
  - failure to thrive
  - stricture of the oesophagus

Treatment :
- **Conservative**
- **Surgical indication**
  - failure of conservative
  - persistent oesophagitis and anaemia
  - persistent failure to thrive
  - intractable vomiting

Para – oesophageal hernia
- oesophagus is of normal length
- stomach is herniated above the diaphragm
- vomiting usually occurs

Surgery
- **anti – reflux procedure**
- **fundoplication (Nissen fudoplication)**



Hiatus Hernia (14)

Important Notes For The Resident

Gastro-oesophageal Reflux

- Very common.
- Due to immature gastro-oesophageal sphincter mechanism.
- Usually functional and improves by 12-15 months.

Diagnosis & Work –up.

- May will have Hiatus hernia.
- Common in cerebral palsy& in oesphageal atresia patients.
- History of vomiting after feeds. Particularly when lying down.
- Failure to thrive.
- The infant can tolerate the mixed feed, but vomits the milk.
- Required barium swallow & PH monitoring for 24 hours.

Management

- Thickining of feeds.
- Sitting upright after feeds.
- Surgery is indicated if the conservative measures fail to respond

Abdominal Pain

Diagnosis	Visceral	
	Referred	(Heart, Lungs, Spine, Hips & Testes)
Pattern	Visceral	Generalized
	Somatic	Localized
Categories	Acute inflammation	Suppuration
	Peritonitis	Intestinal obstruction
	Strangulation	Intra peritoneal haemorrhage
Causes	Spasm	Distension
	Peritoneal inflammation	Irritation
	Ischaemia	Traction → mass attached to the intestine
	Malignant infiltration	
Systemic	Septicaemia	
	Heart failure	
	Diabetes	
	Sickle cell crises	
	Uraemia	

Abdominal Emergency

Assessment of physical findings

- It is of greater practical importance to establish whether pain is still present, becoming worse, or subsiding.
- Referred tenderness: can be elicited by direct palpation over any distended or inflamed loop.
- Localized tenderness: found in
  - Excess flatus
  - Overloaded colon
  - Hyperplastic lymph nodes
  - Acute appendicitis
  - Strangulated gut
- Guarding: a variable degree of involuntary increased muscle resistance, referred to local peritonitis.
- Rigidity localized over the obstructed segment of gut indicate gangrene, or perforation, or local peritonitis.
- Board-like rigidity often found in general peritonitis.

bilious vomiting → intestinal obs. until proven.

Abdominal Emergency

The cardinal symptoms

- Pain.
- Vomiting
- Diarrhoea

- All abdominal pain in childhood lasting 3-4 hours or more should be regarded as evidence of a potential abdominal emergency until proven other wise.
- Persistent vomiting should raise the possibility of a small bowel obstruction.
- Diarrhoea lasting more than 24 hours, should suggest the possibility of a pelvic lesion.
- In proven cases of gastro- enteritis diarrhoea does not preclude the possibility that appendicitis or intussusception may supervene.

Common abdominal emergency in children

Causes

- Infantile hypertrophic pyloric stenosis (IHPS)
- Intussusception.
- Incarcerated inguinal hernia.
- Intestinal obstruction.
- Mesenteric lymphadenitis.
- Acute appendicitis.
- Urinary tract disorders.

Less common causes

- Meckel`s diverticulitis.
- Adhesions.
- Constipation.
- Gastroenteritis.

Infantile Hypertrophic Pyloric Stenosis
" IHPS "

(hunger pain)

- Hypertrophy of the circular muscle layer increases the length and the diameter of the pylorus.
- Boys are affected four times more than girls.
- Incidence about 3/ 1000 liveborn infants.
- Unknown aetiology, with strong genetic predisposition.

Symptoms

- Projectile vomiting, commenced at 2-3 weeks of age.
- Failure to thrive, including loss of weight.
- Constipation. (no intake).

apetite is good

Signs

- Visible peristaltic waves passing from Lt, to Rt.
- A palpable tumour "Olive like mass" in the epigastrium or right upper quadrant.

(normally from right to left).

between xephisternum and umbilicus.

to the right of rectus sheath.

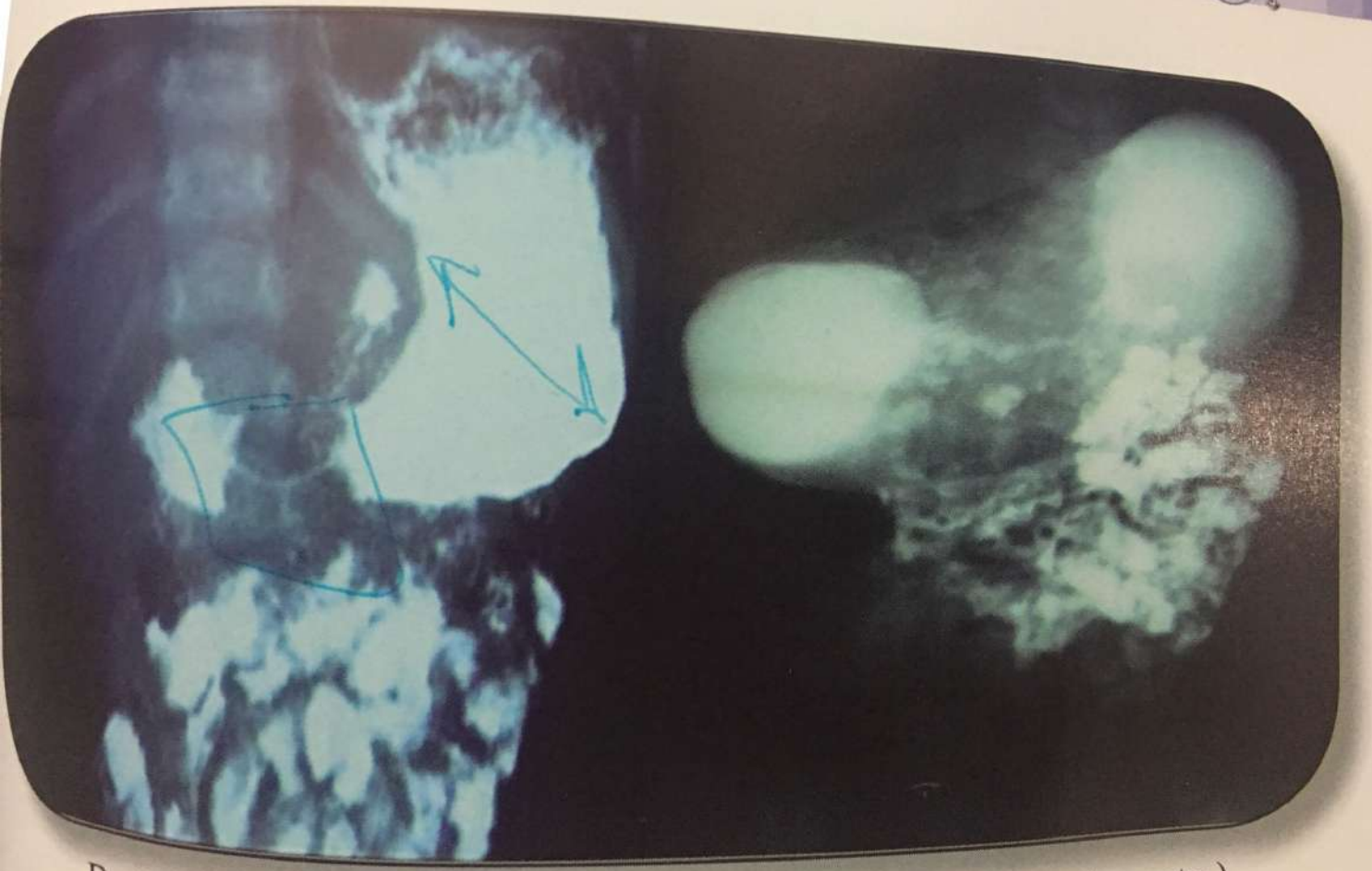
Infantile hypertrophy pyloric stenosis

Progress

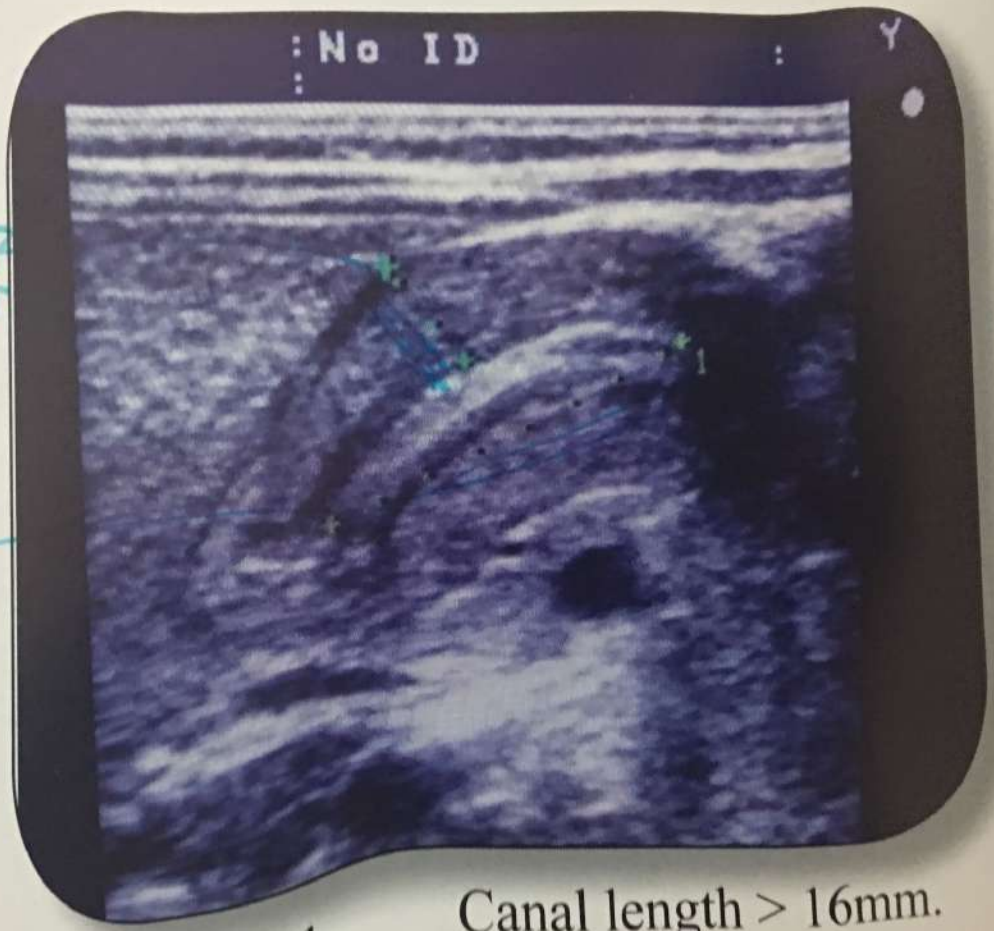
- Crying and restlessness, because of the hunger pain.
- The ability to feed again immediately after vomiting.
- The vomitus contains milk with some added gastric mucus and never bile-stained.
- Coffee grounds, in the vomitus, indicate severe gastritis.
- Hypochloraemic alkalosis,related to the length of the history.
- When the stenosis prolonged, the baby becomes weak and dehydrated and metabolic alkalosis.

Diagnosis

- Feeding test.(palpable mass during feeding).
- Barium meal, (String sign, dilated stomach, delayed empty.) should be avoided with the availability of ultrasound.
- Ultrasound. Canal length > 16mm.
  Muscle wall thickness > 3mm.



Barium meal, (String sign, dilated stomach, delayed empty.)



Ultrasound, Canal length > 16mm.
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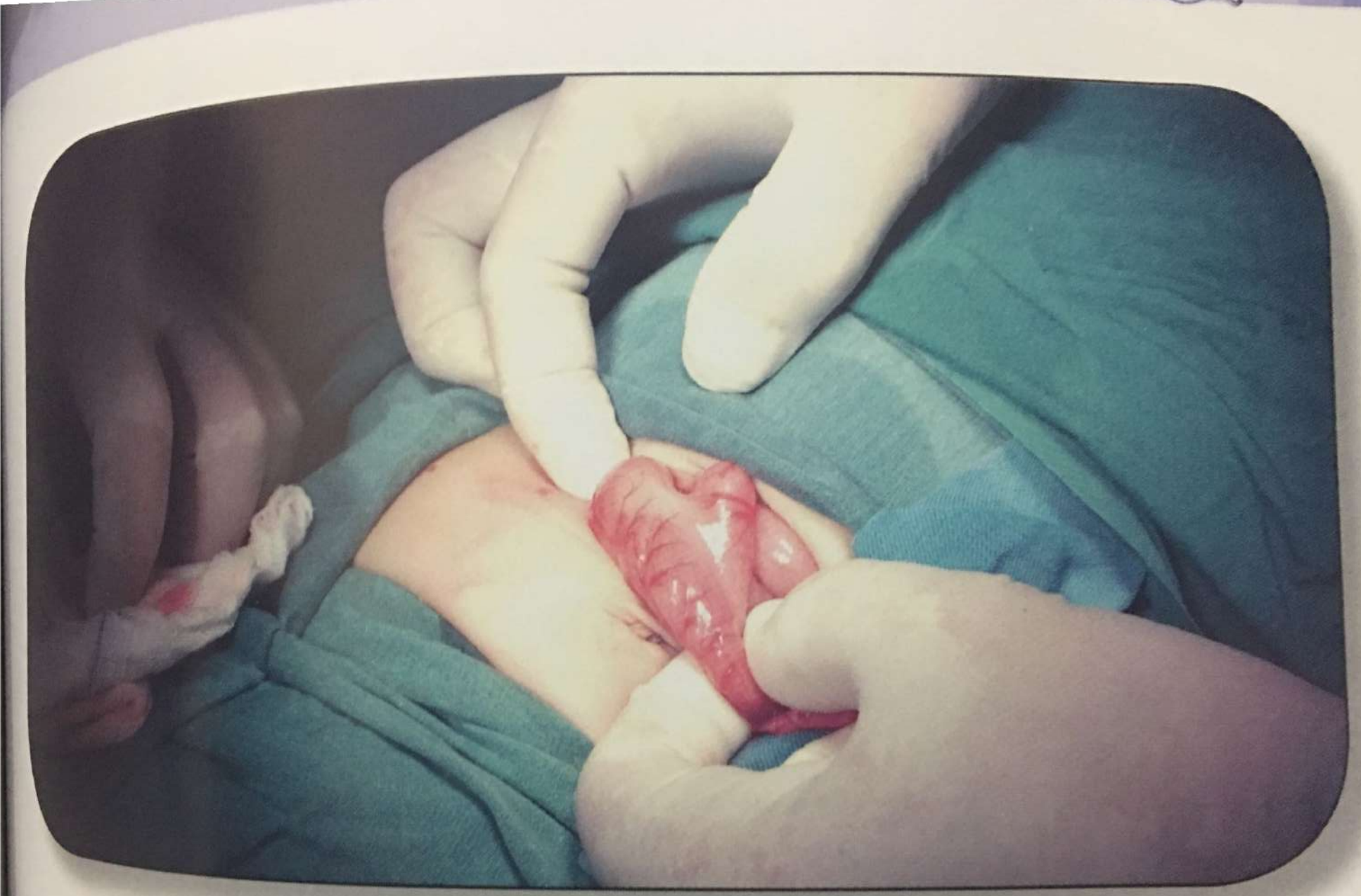
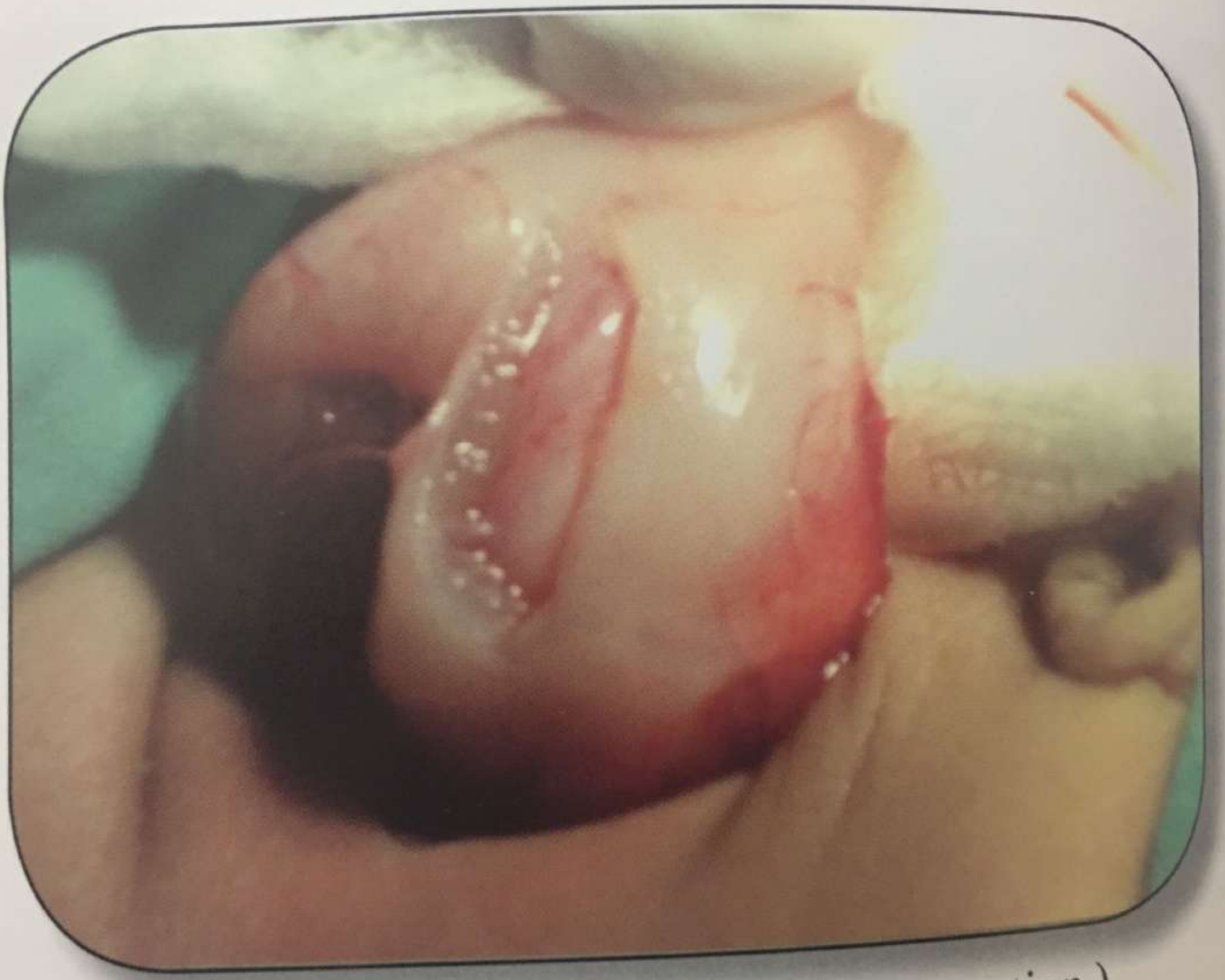


Operative finding of IHPS



Pyloromyotomy (Ramstedt's Operation)

Infantile hypertrophy pyloric stenosis

Differential diagnosis

- Mismanagement of the feeding programme.
- Gastric outlet obstruction, (malrotation).
- Gastro-oesophageal reflux.
- Intracranial condition, (cerebral birth injuries, meningitis).
- Infections, (septicaemia).

Treatment

- Fluid and electrolyte disturbances must be corrected.
- Correct the dehydration.
- Discontinued oral feeding.
- Stomach emptied by nasogastric tube.

Surgery

- Ramstedt`s pyloromyotomy, (serosal incision, pyloric muscle widely separated down to submucosa, intact bulging mucosa)

Important Notes For The Resident

Infantile Hypertrophic Pyloric Stenosis

- Diagnosis & Work-up.
- History. Clinical examination and feeding test.
- Ultrasound (for pyloric muscle thickness & canal length).
- Get the necessary labs and blood gas.

Pre-op.

- Resuscitate with N/saline & D5% with added KCL.
- The infant is well hydrated and U&E and blood gases within normal.

Post-op. care.

- N/gastric tube.
- Need I.V. fluids .
- Pyloric regimen.

Intussusception

→ weaving theory

- The invagination of one portion of the intestine into an adjacent segment,
- Compression of the mesenteric vessels causes a strangulation may progress to gangrene and perforation.
- Classified according to the site of the inner intussusceptum and outer intussuscipiens.
- More than 80% are ileocolic.
- Boys are more often affected than girls.

Intussusception

Causes

Primary (unknown)

- Peak incidence is between 5 to 10 months of age.
- 80% under the age of two years.
- Peyer`s patches, a lymphoid tissue in the distal ileum may be oedematous as the result of virus infection (Resp. & Git. Infection).
- Weaning may lead to a change in the bowel flora, which produce oedematous peyer`s paches.

Secondary

- 2% of children, secondary to a pathological lead point.
- More in older children, over the age of 2 years.
- Such as :
  - Meckel`s diverticulum.
  - Enteric duplication cyst, sub mucosal cyst.
  - Mucosal polyp.
  - Bowel malignancy (Lymphoma) or peutz-jeghar

Intussusception

Symptoms

- Distressing colicky pain in a previously healthy infant.
- The pain lasting 2-3 minutes.
- During the attacks of pain, draws up his knees,relaxing as the spasm eases.
- Spasm occur in interval of 15 – 20 minutes.
- Between episodes, the infant appears well.

*Later vomiting (milk then bile).becomes pale, exhausted and drowsy.

- Pass a "redcurrant jelly"stool.

Signs

- Observing the spasm of the pain.
- Palpable sausage – shaped mass, anywhere around umbilical.
- Rectal examination reveal blood or feeling the apex .

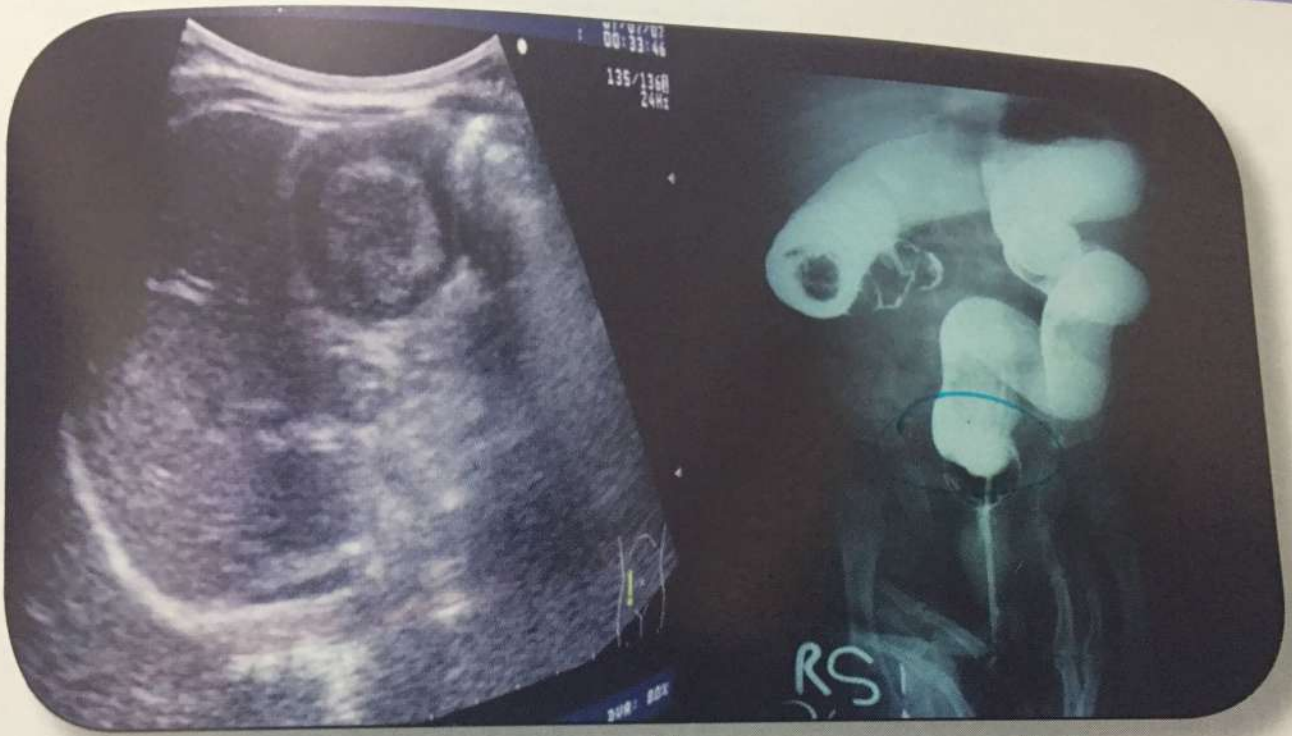
Intussusception

Diagnosis

- Plain x-ray shows signs of small bowel obstruction and soft tissue opacity.
- Confirmed by contrast barium enema, diagnostic (meniscus, coiled-spring) signs.
- Abdominal ultrasound, showing a mass, diagnostic (kidney – like mass and target) signs.

Management

- Non- operative reduction.(hydrostatic or pneumatic reduction).
- Using a barium enema or air at controlled pressure.
- Reduction monitored by fluoroscopy.
- Successful reduction can be accepted only if.
  - Free reflux of barium or air into the small bowel.
  - Resolution of the symptoms and signs
  - Disappearance of the abdominal mass by clinical examination and by ultrasound evaluation.



Ultrasound
(Target sign)

Barium enema shows
(Coiled-spring sign)

Intussusception

Intussusception

- 70% of intussusception can be reduced non-operatively.
- Recurrent intussusception occurs in up to 10% of cases after non-operative reduction.

Contraindication of the non-operative reduction

- Signs of peritonitis or perforation.
- Known pathological lead point.
- In the presence of shock.

Surgical Treatment

- If non-operative reduction is contraindicated.
- In unsuccessful non-operative reduction.
- If a pathological lead point is suspected.
- In cases of recurrence after reduction.

Resection and anastomosis

- Non-viability of the segment.
- Irreducible intussusception.
- Presence of a pathological lead point.

Important Notes For The Resident

Intussusception

- Commonest among plump infants between the age of 4-12 months.
- A history of upper respiratory tract infection or gastroenteritis.
- Intermittent colics, and drawing up of the legs.
- Recurrent vomiting.
- Bloody mucoid stool (red currant jelly).
- Baby may become dehydrated and appear acutely ill.

Diagnosis

- Barium enema.
- Ultrasound.(Kidney-like mass, Target-like sign).

Management

- Hydrostatic reduction.
- Pneumatic reduction.
- Surgical operation.

Acute appendicitis

- the commonest abdominal emergency in children.

Pathology

- Obstructed
  - by fecolith, parasites or foreign body in the lumen.
  - Lymphoid tissue, or tumour as obstructed lesion.
- Non-obstructed:by direct infection from the lumen, or haematogenus.

Course

- Acute inflamed appendix may resolve.
- May undergoes gangrene, and perforation.
- Present as general peritonitis.
- Formation as localize mass or abscess.

Suspected appendicitis

- Local tenderness in the RIF.
- Local peritonitis in the RIF.
- Generalized peritonitis.
- Inflammatory mass.
- Intestinal obstruction.
- Gastro-enteritis.

Acute appendicitis

Clinical feature

Pain: Typically central, peri-umbilical, which shifts after few hours to RIF, or to the site of the inflamed appendix (pelvic, retrocecal, and retro-ileal).

- Nausea, vomiting, constipation and diarrhea may occur.
- Acute appendicitis can coexist with pneumonia, tonsillitis, or generalized lymphadenopathy.
- Gastroenteritis may occur co-incident with acute appendicitis.

Examination

- Pyrexia & tachycardia suggested an infective cause.
- The child is reluctant to move or cough that may aggravate the pain.
- Localised tenderness at RIF,* Muscle irritation (psoas,or obturator sign).
- Release tenderness, (Rovsing`s sign, Rebound tenderness).
- Muscle guarding and rigidity over the site of the inflamed appendix.
- Active observation and repeating abdominal examination, prevents many unnecessary explorations.
- Rectal examination can be diagnostic.

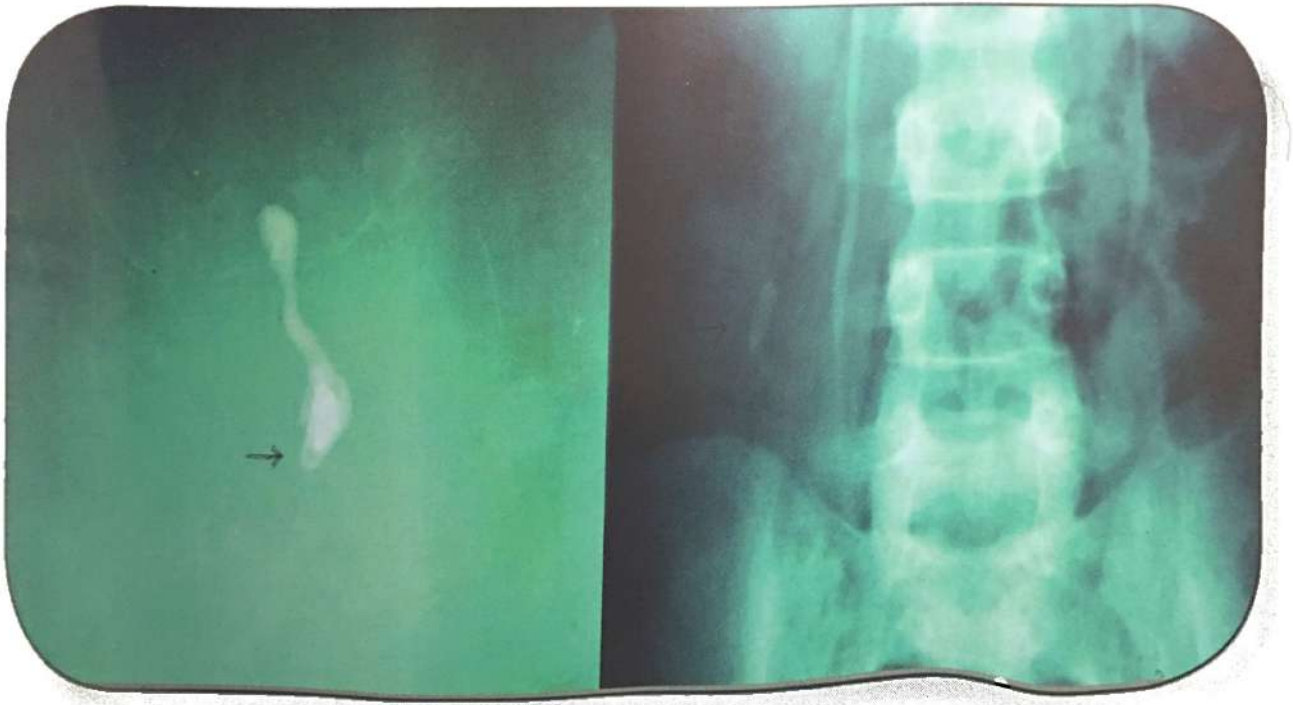
Acute appendicitis

Investigation

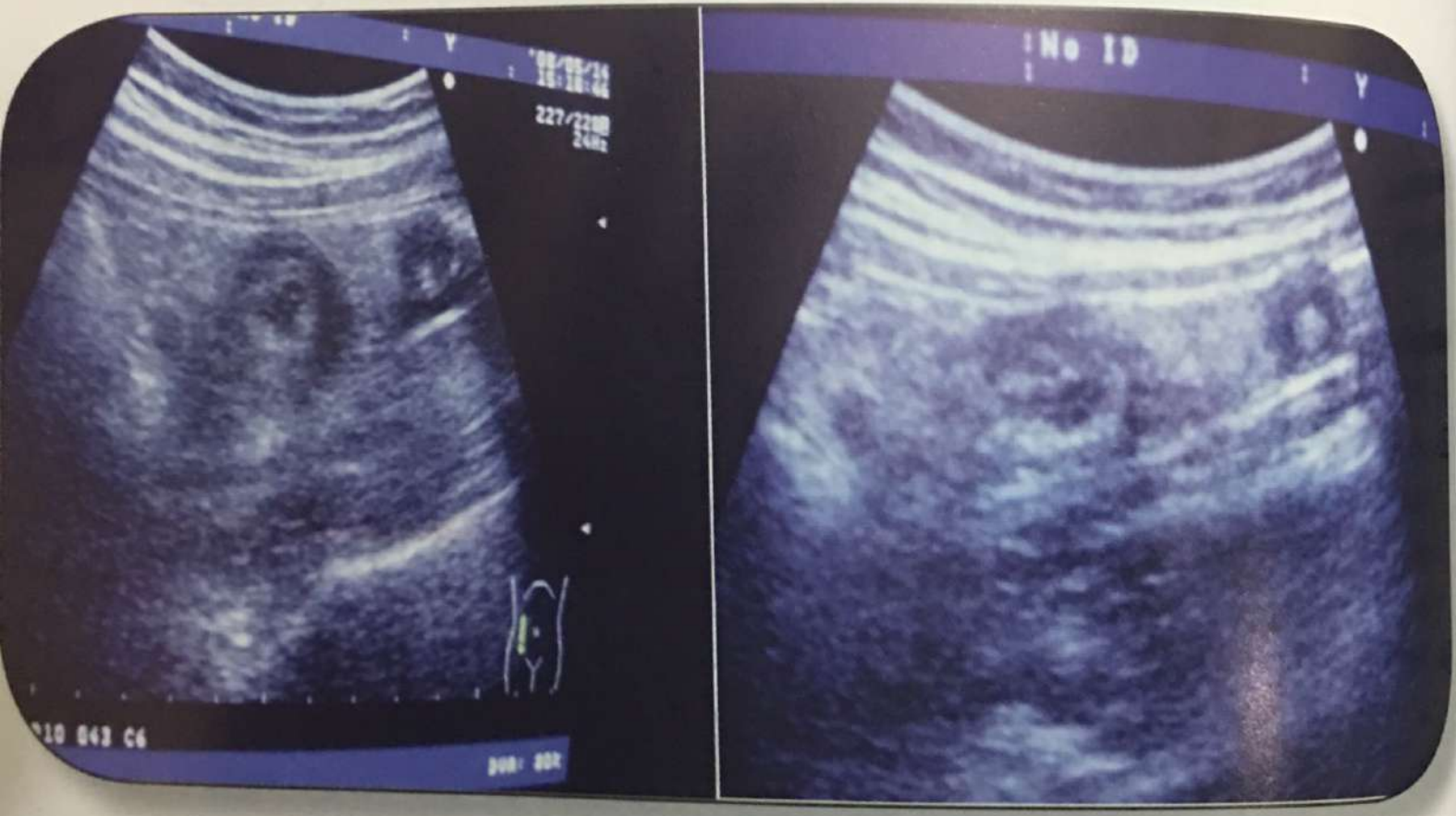
- Blood count: neutrophil leucocytosis.
- Abdominal x-ray may show abnormal bowel dilatation, faecolith calcification.
- Ultrasound: noncompressable tubular mass, free peritoneal fluid, mesenteric thickening, target sign,appedicular mass or frank abscess.
- CT scanning : selectively used.

Differential diagnosis

- Severe non-specific mesenteric lymph adenitis.
- Primary peritonitis.
- Meckel`s diverticulitis.
- Ruptured ovarian cyst in female.
- Torsion of an ovarian cyst or ovary in female.
- Torsion of the omentum.
- Suppurating deep iliac lymph nodes.



Appedicular fecolith as radio-opaque shadow shown out side the course of the ureter. Positively seen at the appedicular specimen.



Target Sign

Localise the fecolith

(Ultrasound for Appendicitis)

Mesenteric lymph adenitis

- Abdominal pain and fever with upper respiratory tract infection.
- Abdominal tenderness either centrally or in the RIF. (shifting tenderness).
- No sign of localized peritonitis, absence of rigidity.
- The condition is self limiting, only by symptomatic treatment.
- The most troublesome condition is the difficulty in distinguishing from acute appendicitis.
- In severe adenitis in which the distinction can not be made, the only safe course is to explore the appendix.

Important Notes For The Resident

Appendicitis

- Commonest emergency in paediatric surgery.
- Periumbilical pain shifting to RIF.
- Colicky at first changing to continous pain.
- Vomiting generally after the pain.
- Having diarrhea in up to 10% of cases.
- Examine the throat for tonsillitis or pharyngitis.
- Localized tenderness at RLQ.
- Leucocytosis in the CBC lab test.

Plain abdominal x-ray.

- Might show signs of localized peritonitis(dilated fixed loops).
- Might shows a calcified fecolith.

Ultrasound.

- Interloop collection of peritoneal fluid.
- Non compressable tubular mass with a diameter of 6mm, or more.
- Frank abscess indicate complicated appendicitis.
- Appendicular mass.

Important Notes For The Resident

- It is important to realize that acute appendicitis can coexist with other conditions, so that the finding of pneumonia, tonsillitis or generalized lymphadenopathy should not divert attention from any abdominal signs which may also be present.
- It is important that any gastroenteritis may occur coincident with intussusception or with acute appendicitis so that even a well-established and undoubted diagnosis of gastroenteritis should be subject to review.
- When any doubt arises in distinguishing gastroenteritis from an intussusception, early recourse to a diagnostic ultrasound or barium enema is essential.
- Most cases of intestinal obstruction in older children are due to band or adhesions following a previous abdominal operation, most commonly appendicectomy.

Gastro-Intestinal Bleeding In Children

Clinical types

1- Ano-rectal bleeding.
2- Haemorrhage accompanied by other clinical features.
3- Haemorrhage in the neonatal period.
4- Massive haematemesis or melaena.

Diagnosis;
depends on:

- The age of the patient.
- The type and quantity of bleeding.
- The associated symptoms.

Gastro-Intestinal Bleeding In Children

- Large or small amount of bleeding, from either end of the GI tract.
- Small haemorrhage is one of 20ml. or less.
- Large haemorrhage is one exceeding 200ml.

Ano-Rectal Bleeding

- Passage of a small volume of blood.
- Most often in the anal canal.
- Less common in the rectum.
- Infrequently in the colon.
- Blood may pass rapidly through the tract from as high as the small bowel, duodenum, stomach and oesophagus.
- Precise information as to whether the blood was in streaks on the outside of the stool or mixed.
- Inspection and digital examination to evaluate the diagnosis.

Gastro-Intestinal Bleeding In Children

Ano-Rectal Bleeding

Common Causes

- Anal fissure.
- Juvenile polyp.
- Rectal prolapse
- Meckel`s diverticulum

Rare Causes

- Familial polyposis.
- Haemangiomas.
- Ulcerative colitis.
- Multiple polyposis.
- Malignancy.

Gastro-Intestinal Bleeding In Children

Ano-Rectal Bleeding

Types:

- Fresh blood, the pathology between the anal margin and the lower sigmoid colon.
- Blood clots or cherry red blood, indicate colonic bleeding.
- Melaena or altered blood, due to haemorrhage from the GI. tract between the oesophagus and the small bowel.
- Occult bleeding, Means positive haemoccult stool with recurrent anaemia.

Gastro-Intestinal Bleeding In Children

Common Causes

	Newborn	1M-1Yr	1-2Yr	>2Yr
*Upper GI tract	* Hemorrhageic disease * Swallowed maternal blood	* Esophagitis * Gastritis	Peptic ulcer disease	Varices
*Lower GI tract	* Anal fissure	* Anal fissure (constipation)	* Polyps	* Polyps
	* Necrotizing enterocolitis	* Intussusception	* Meckel`s diverticulum	*Inflammatory bowel disease

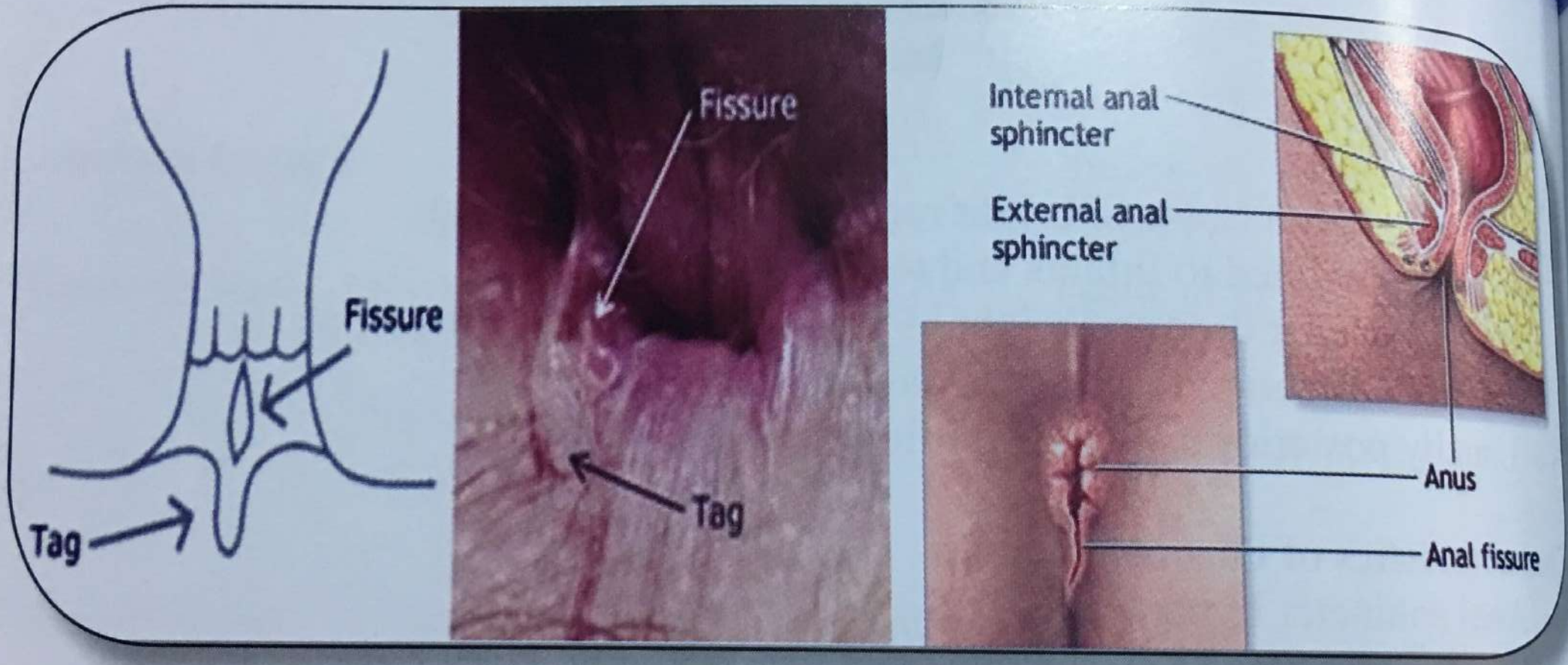
Gastro-Intestinal Bleeding In Children

Anal Fissures

- Most common cause of bright red blood in 1-10 year old.
- Almost confined to infants and toddlers.
- Few streaks or drops of bright blood on the surface of the stool.
- Painful defecation (crying on passing motion).
- Usually posterior position (midline).

Characteristics of chronic fissures

- Anal sphincter hypertrophy.
- Chronic ulceration.
- Sentinel skin tag.
- Anal papilla.



Anal Fissure (14)

Gastro-Intestinal Bleeding In Children

Anal Fissures

Treatment

- Must be directed to the underlying constipation.
- In persistent lateral anal fissures, should rule out,
  - Immuno – deficiency.
  - Inflammatory bowel disease.

Acute fissure

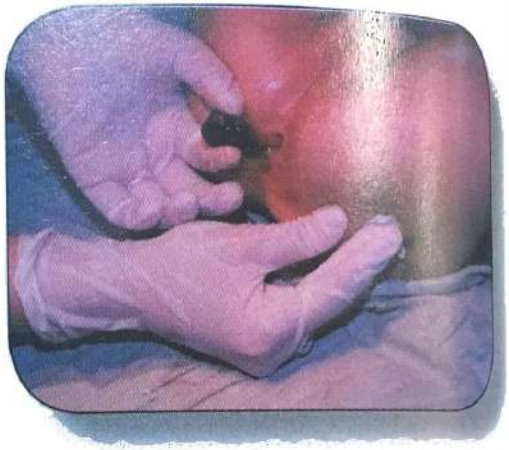
- Stool softeners.
- Sitz baths.
- Gentle dilation.

Chronic fissure

Measures to reduce sphincter tone.

- Botulinum toxin (Botox).
- Sphincterotomy.

Gastro-Intestinal Bleeding In Children



Common types of polyps

- Juvenile polyps 80%
- Lymphoid polyps 15%.
- Adenomatous polyps 3%.

Juvenile polyps

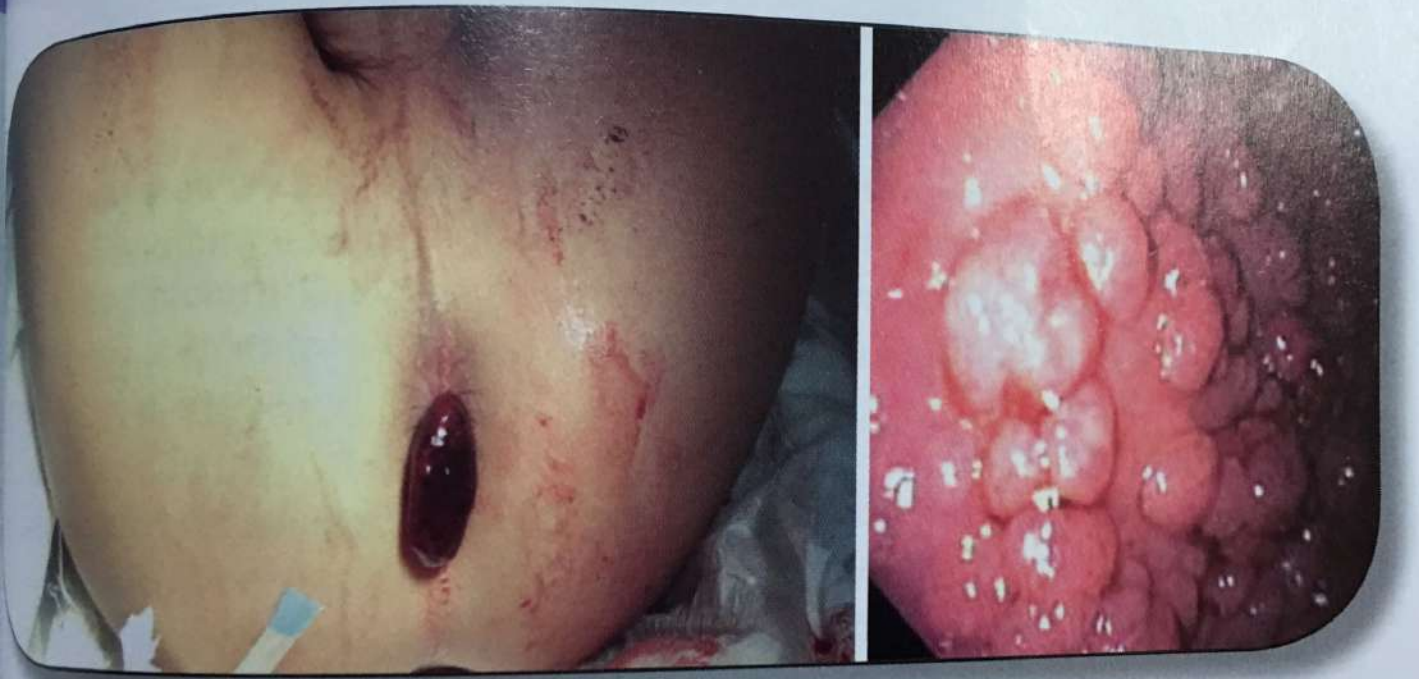
- Hamartomatous tissue
- Not premalignant

Presentation

- Rectal bleeding 93%, bright bleeding , painless & intermittent
- Blood streaked faeces, at the end of defaecation.

Adenomatous polyps

- Dysplastic growth.
- Premalignant.



Juvenile polyp prolapse

Multiple polyposis syndrome

Gastro-Intestinal Bleeding In Children

Multiple polyposis syndrome

- More than 5 polyps with out family history of polyposis syndrome.
- Any number of polyps with family history of polyposis syndrome.
- Familial polyposis coli (multiple adenomatous polyps)
- carry high risk of malignancy during adult life.

Peutz – Jeghers syndrome

- Presence of pigmented freckles on the mucocutaneous margins of the lips and the anus.
- Polyps are found anywhere in the gastro-intestinal tract.
- Most common in the jejunum.
- Presented as massive bleeding, or intussusception.
- The cumulative risk of cancer approaches 70% by age 60.

Gastro-Intestinal Bleedi
In Children

Rectal prolapse

Predisposing factors

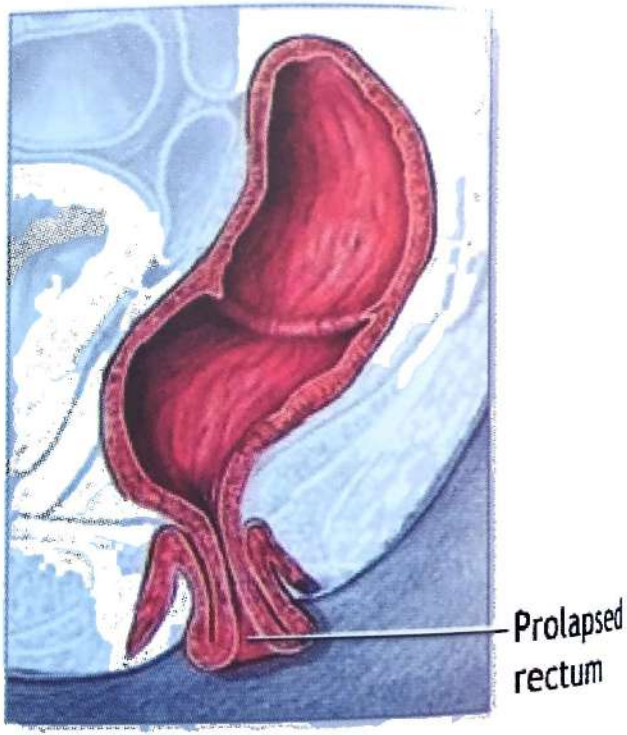
1- Straining at stool by a child with constipation.
2- Frequent diarrhoea as a part of:
   * Malabsorption syndrome.
   * Associated with cystic fibrosis.
   * Associated coeliac disease.
3- Healthy hyperkinetic child because the act, of ill training by prolong the attempts to defecate producing excessive straining with out constipation.

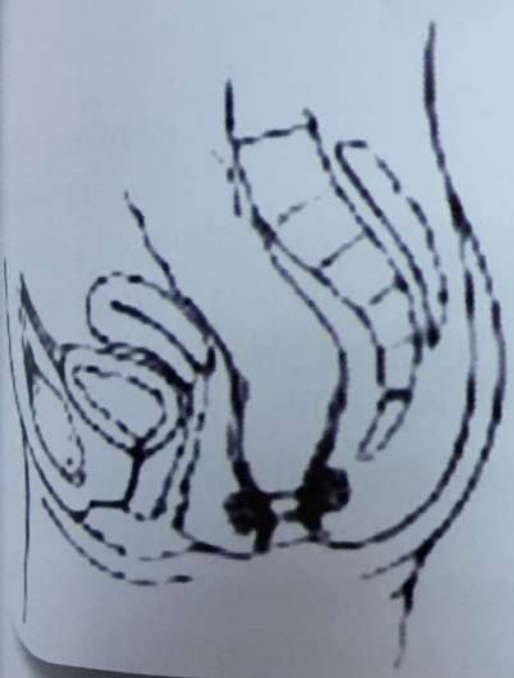
Gastro-Intestinal Bleeding In Children

Rectal prolapse

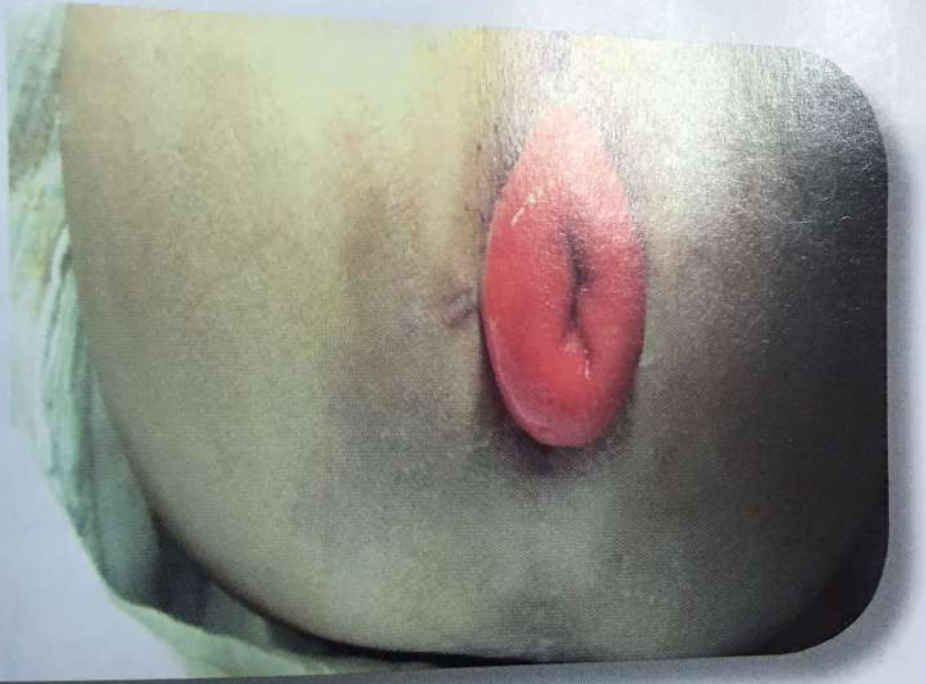
Organic causes

1- Paralysis of anal sphincters in myelo-meningocele or sacral agenesis.
2- Marasmic, undernourished, hypotonic infant.
3- Ectopic vesicae, due to separation of symphysis pubic and divarication of pubo-rectalis muscle.
4- Can be the presenting sign of cystic fibrosis.





Thiersch operation



Rectal Prolapse

Gastro-Intestinal Bleeding In Children

Rectal prolapse

Clinical features

- The incidence peaks at age 1-3 years.
- The prolapse rolls out painlessly only during defecation.
- Usually returns spontaneously.
- Manual replacement is infrequently required.
- The prolapsed mucosa, causes bleeding.

Differential diagnosis

1- Rectal polyps may prolapse.
2- The apex of an intussusception.
3- External haemorrhoids.

Gastro-Intestinal Bleeding In Children

Rectal prolapse

Treatment

Treating the underlying cause allows conservative management to be successful.

1- The stool : Treat the constipation or the malabsorption.

2- The seat : Avoid squatting position- (stretching the anal sphincters should be avoided)

3- Sedation : Small doses, helpful in toilet training.

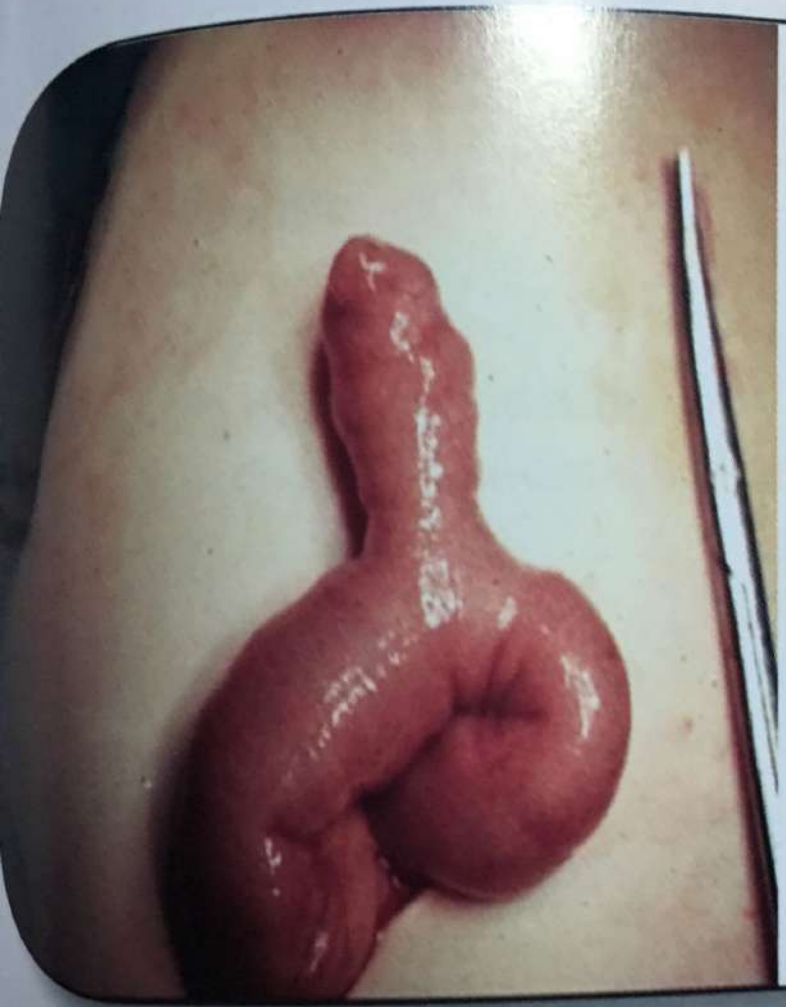
4- Strapping : Transverse strip to the buttocks.

5- Surgical management is usually reserved for failed conservative management and in cases of complicated rectal prolapse (eg, recurrent rectal prolapsed that requires manual reduction, painful prolapse, ulceration, and rectal bleeding). Surgery by using non- absorbable suture in subcutaneous tissue around the anus (Thiersch operation).

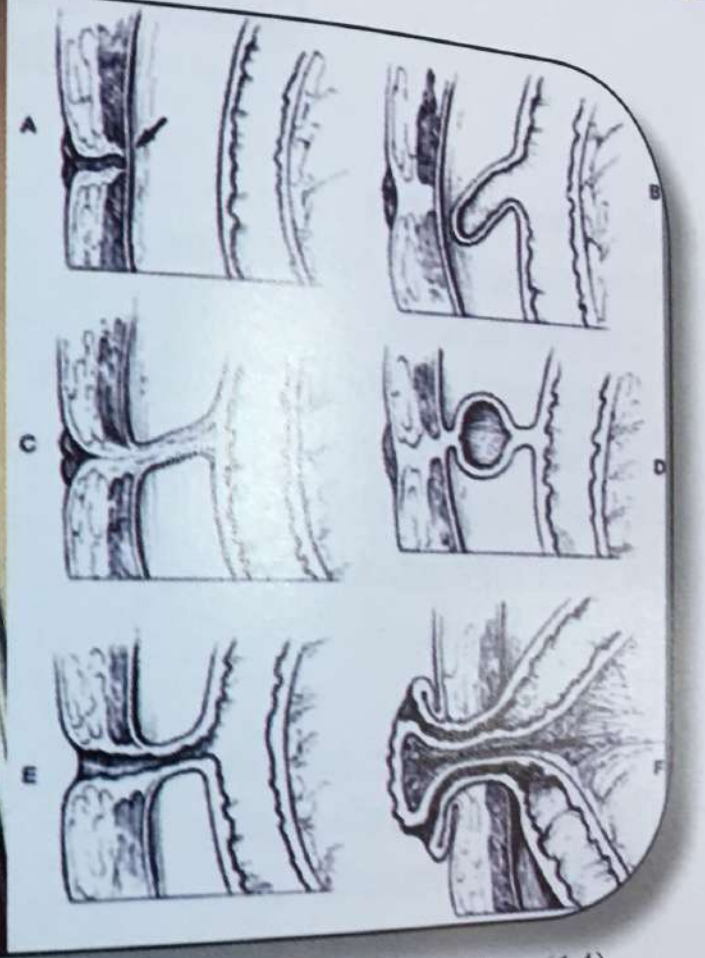
Gastro-Intestinal Bleeding In Children

Meckel`s diverticulum

- It is true diverticulum contains all intestinal layers.
- Omphalomesenteric (vitelline) duct connects the primitive gut to the yolk sac.
- Failed regression of the vitelline duct results in various pathological anomalies such as :
  - Meckel`s diverticulum.
  - Umbilical polyps.
  - Umbilical fistula.
  - Umbilical sinus.
  - Umbilical cyst.
  - Persistent fibrous band.



Meckel`s diverticulum



various anomalies (14)

Gastro-Intestinal Bleeding In Children

Meckel`s diverticulum
Associated congenital anomalies

1- Cardiac defects.
2- Congenital diaphragmatic hernia.
3- Duodenal atresia.
4- Oesophageal atresia.
5- Imperforate anus.
6- Gastroschisis.
7- Malrotation.
8- Omphalocele.
9- Hirschsprung`s disease.
10- Down`s syndrome.

Gastro-Intestinal Bleeding In Children

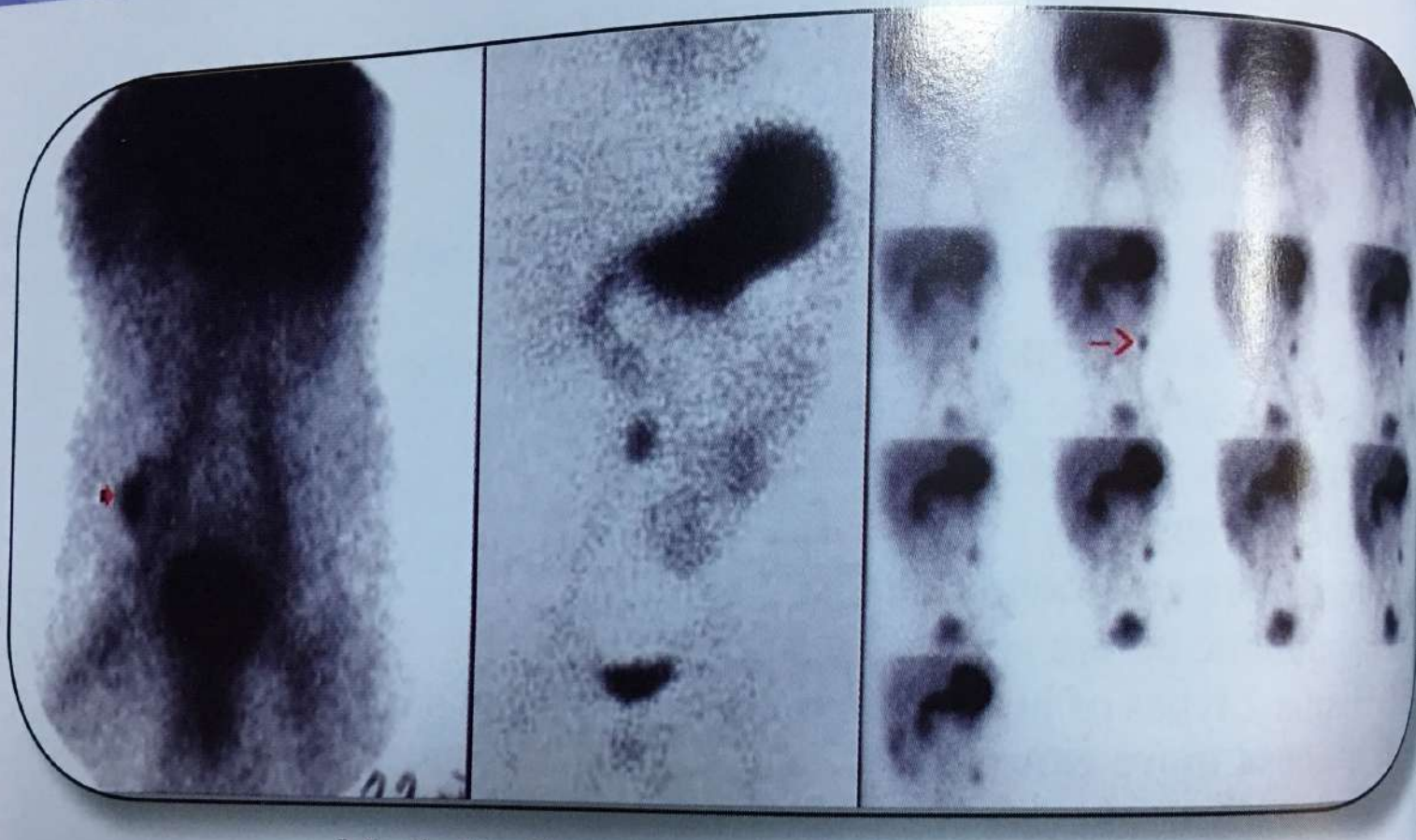
Meckel`s diverticulum

Rule of 2×7

- Incidence 2% of the population.
- Located 2 feet of the ileo-cecal valve.
- 2 centimeters in diameter.
- 2 inches in length.
- 2 times more common in males.
- Symptomatic before age of 2 years.
- Contains 2 types of hetrotopic tissue, (gastric and pancreatic).

gastric mucosa more common.

- 10% asymptomatic patients.
- 50% symptomatic patients.



Meckel`s diverticulum Scan –TC99m.
Positive uptake

Gastro-Intestinal Bleeding

Meckel`s diverticulum

Symptoms related to the pathology with specific age groups.

- Abdominal pain.
- Vomiting.
- Abdominal distention.

Due to :

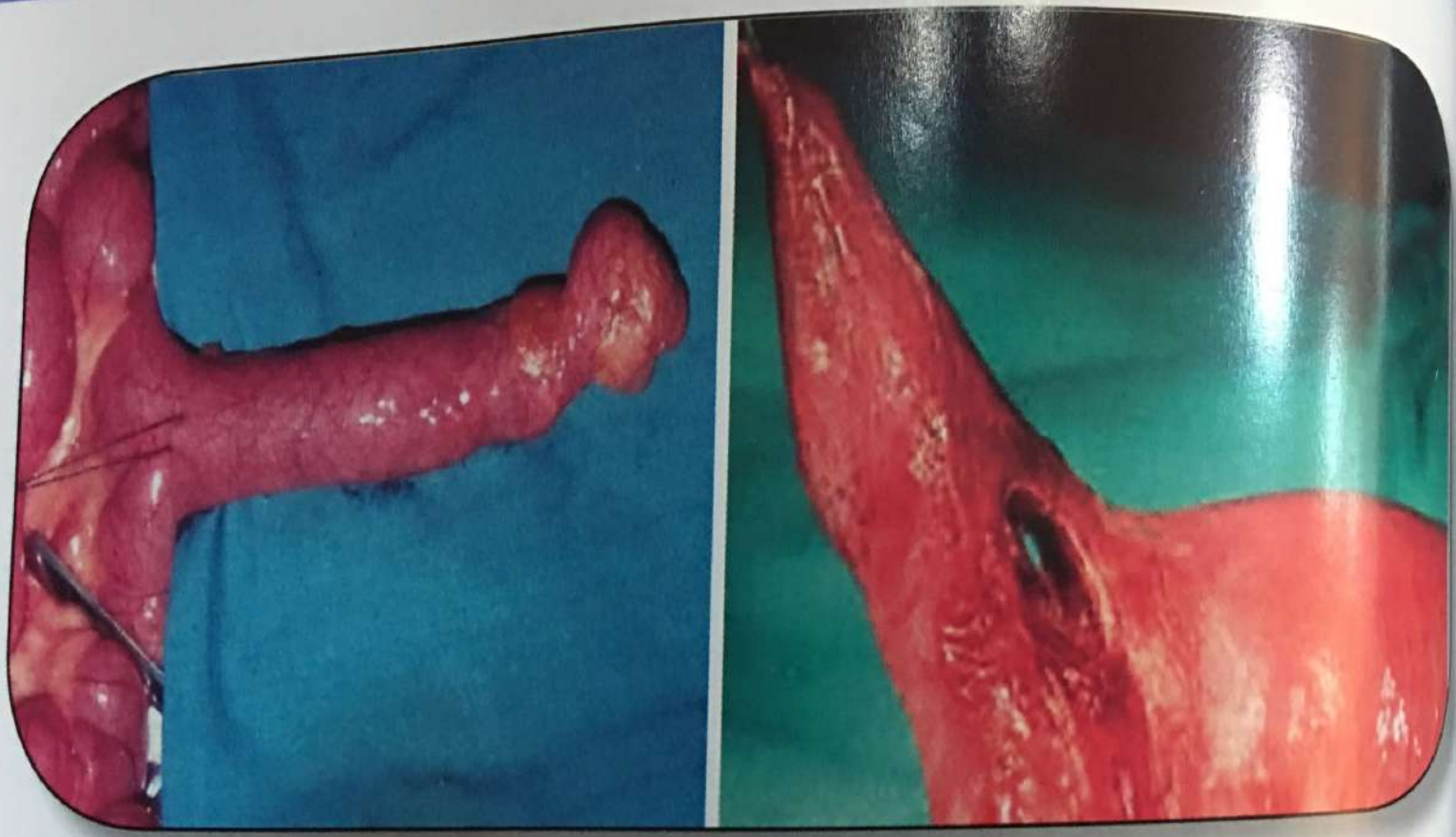
- Intestinal obstruction.
- Intussusception.

Older Infants & Younger Children

- Painless lower gastro-intestinal bleeding.

Older Children

- Presented as inflammation diverticulitis like appendicitis.



Meckel`s diverticulum

Perforated diverticulum

Gastro-Intestinal Bleeding In Children

Meckel`s diverticulum

Treatment

- Diverticulectomy(wedge resection) with transverse closure of the ileum to maintain luminal patency.
- Small bowel resection with end to end anastomosis.
- Incidental appendicectomy.

Asymptomatic Meckel`s

- Resection of the incidental meckel`s is indicated in children less than 8 years. Because the greater risk of complications.
- Resection is indicated in patients of any age who have a Meckel`s diverticulum containing hetrotopic tissue.

Gastro-Intestinal Bleeding In Children

Haemorrhage in the neonatal period

1- Haemorrhagic disease of the newborn. (vit. K def).
(hypoprothrombinaemia and thrombocytopenia)
2- Vomiting altered blood (coffee grounds).
- Infantile hypertrophic pyloric stenosis.
- Gastro-oesophageal reflux, (peptic oesophagitis).

3- Ingestion of blood from the birth canal(maternal blood) or ingestion of blood from cracked nipple.
4- Dark blood mixed with mucus due to strangulation of the bowel in volvulus neonatorum.
5- Rectal bleeding in case of necrotizing enterocolitis.

Gastro-Intestinal Bleeding In Children

Haemorrhage accompanied by other clinical features

1- Intussusception.
- rectal bleeding (red currant jelly).

2- Ulcerative colitis.
- bloody diarrhoea with mucus.
- anaemia and weight loss.

3- Bleeding in gastro-enteritis.
- bloody diarrhoea with dehydration.

4- Familial polyposis.
- rectal bleeding with anaemia.
- positive family history
- muco-cutaneous pigmentation.

Gastro-Intestinal Bleeding In Children

Massive haemorrhage (haematemesis or melaena)

- Haematemesis from oesophageal varices in portal hypertension.
- Haemorrhage from a peptic ulcer in Meckel`s diverticulum.
- Necrotizing enterocolitis, present with rectal bleeding with diarrhoea and abdominal distension.
- Stress ulcer of the duodenum.
  as complication of :
  - burns.
  - intracranial lesions.
  - severe toxic infections.

Important Notes For The Resident

- Special investigation, Barium enema, Proctoscopy or Sigmoidoscopy present difficulties in children.
- Even the air contrast barium enema, may fail to disclose the common simple juvenile polyp.
- Ulcerative colitis and multiple polyposis are the only conditions likely to be revealed by a barium enema.
- General anesthesia is necessary in children for sigmoidoscopy or colonoscopy.
- The most common presentation of symptomatic Meckel's diverticulum is bleeding.
- Some cases of Meckel's diverticula are discovered incidentally during surgery for some other disorder.
- The cumulative risk of cancer in patients with Peutz-Jeghers syndrome aproaches 70% by age of 60 years.
  An aggressive screening and biopsy program should be undertaken, including annual exam with complete blood count, and abdominal and pelvic ultrasound.

Inguino – Scrotal Anomalies

Embryology

* The testis is formed in a longitudinal fold high on the posterior abdominal wall at a similar level to the developing kidneys.
* The testis migrates down the posterior wall towards the deep inguinal ring.
* The gubernaculum, a condensation of mesenchyme,guides the testis through the layers of the body wall towards the scrotum.
* The processus vaginalis, a tongue of the peritoneal cavity moved with the migrating testis through the canal.
* This peritoneal communication, should obliterate and disappear, after birth.

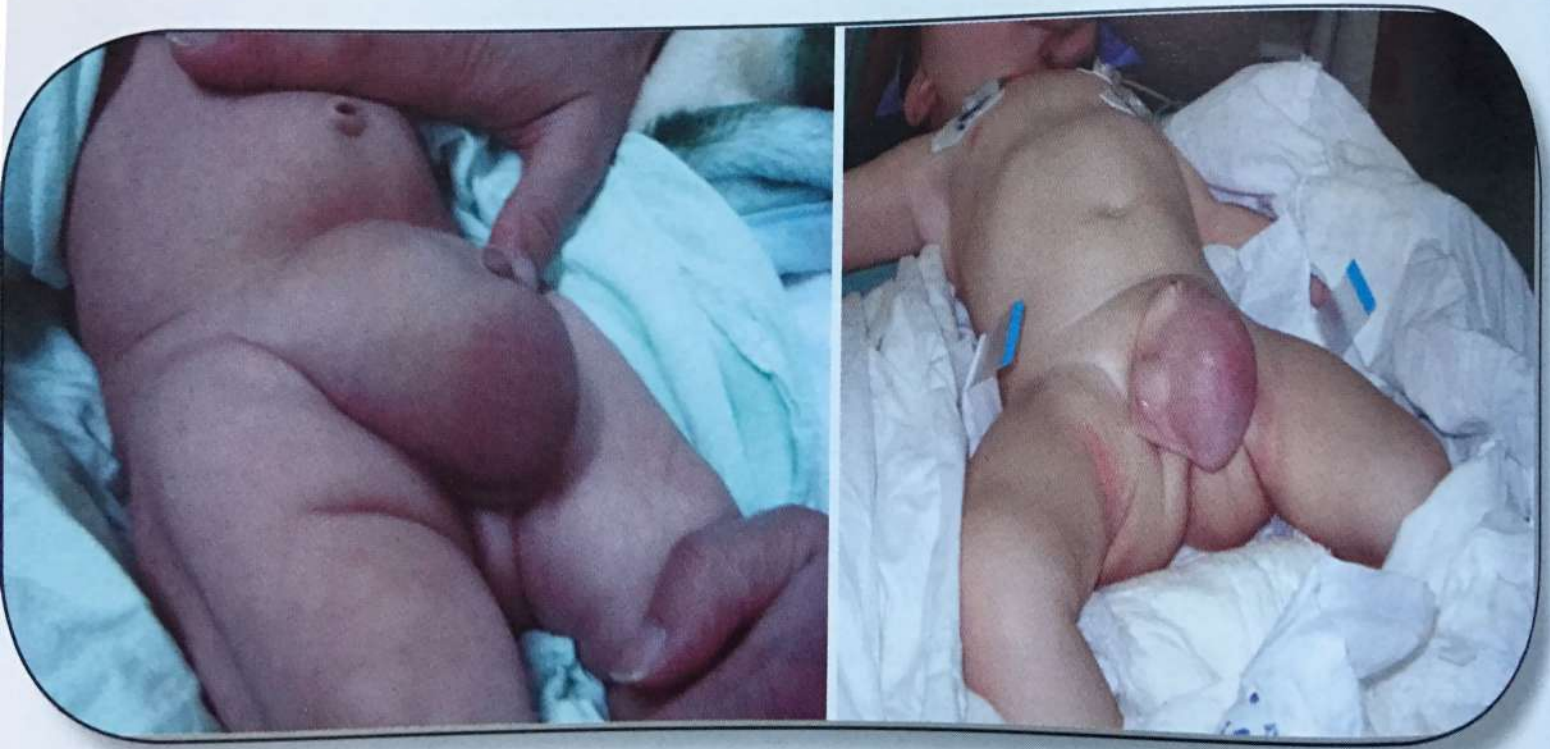
The Groin and Scrotum

Look

- Always examine the groin on both side and the scrotum.
- Look for normal scrotal development.
- Look for a lump and a cough impulse.
- Look for redness, sinuses or scars.

Feel

- Examine both testes, epididymi, and cords.
- Tenderness and induration.
- Palpate for cough impulse.
- Can you get above it.
- Can you feel the testis separate to it.
- Consistency and transillumination.
- Relation to the testis (above, below or within).
- Does it move separately or with the testis.
- Digital rectal examination.



Complete Right Inguino- Scrotal Hernia

Left Inguino - Scrotal Hernia

Inguinal hernia

- Lack of obliteration of processus vaginalis accounts for several clinical conditions.
- Scrotal hernia, completely patent tunica vaginalis.
- Funicular sac (incomplete), an obliterated segment which intervenes between the sac and the tunica.
- Bubonocele sac does not extend beyond the external ring .
- Hydrocele, collection of fluid, and trickles down a narrow tortuous processus and collects in the tunica, (Flap valve).
- Encysted hydrocele of the cord, the fluid collects in a loculus of the processus at some point along its course in the spermatic cord.
  this loculus usually retains its communication with peritoneum.
- Combined abnormalities, proximal hernial sac communicating through a narrow track with a distal hydrocele.
- In girls, the canal of Nuck undergoes the same obliteration of the Processus vaginalis in boys.
- Very low incidence of intersex problems in girls with inguinal hernia.

Hydrocele

Primary

90% communicate via a patent processus with the peritoneum.

Clinical
- Painless cyst containing fluid
- Transluminate.
- Can get above it, Irreducible
- No impulse on coughing, crying or straining.

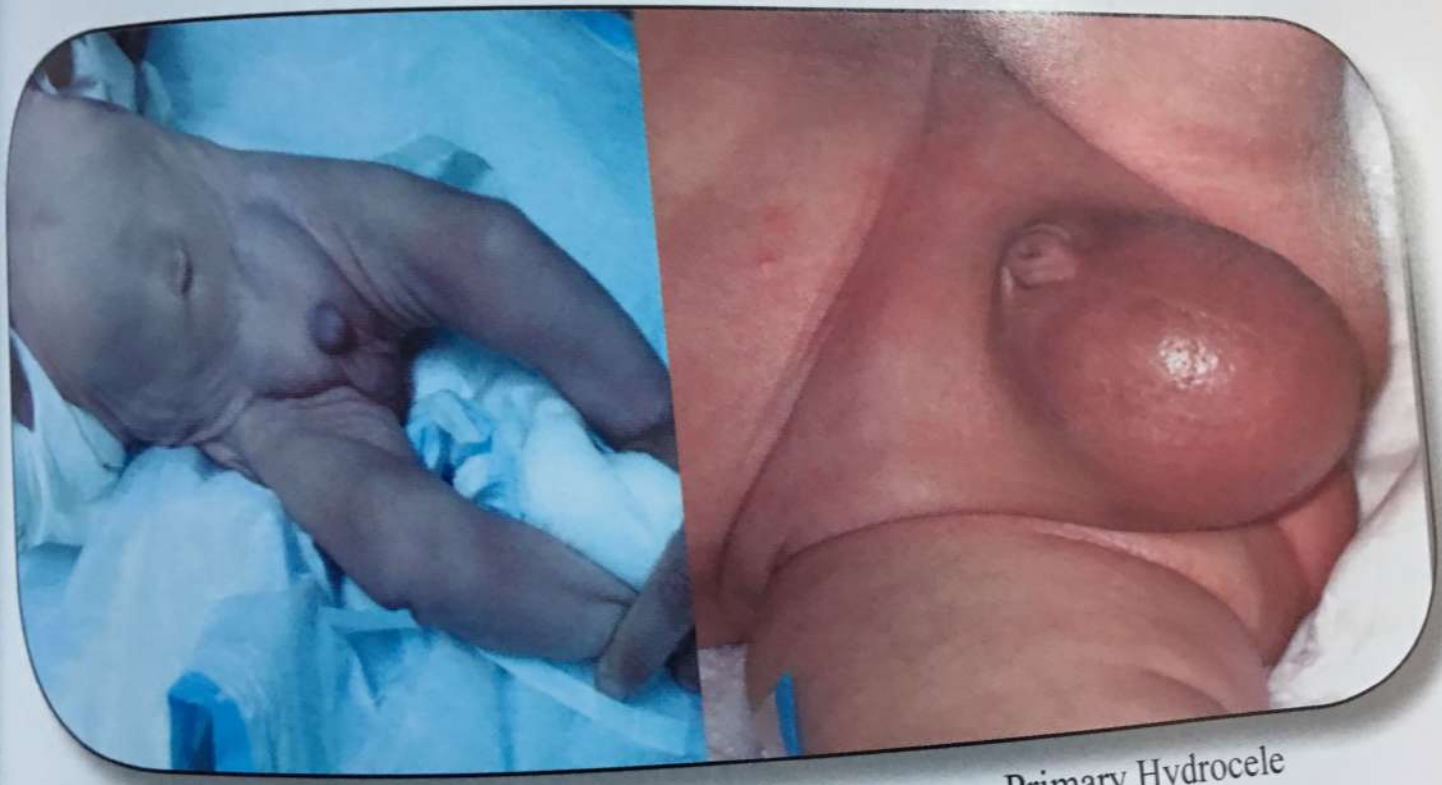
In Infants

- Unilateral or bilateral
- Strong tendency to close and absorb spontaneously. 90%
- Virtually all will have disappeared by the age of 1 year.

In Older children

- Diurnal variation in its size.
- Narrow, tortuous communication with the peritoneal cavity.
- Rarely disappear spontaneously.
- Required high ligation of the communicating track.

Secondary due to: Torsion, Infection, and Trauma



Bilateral hernia in infant

Primary Hydrocele

Inguinal hernia

Diagnosis

- Painless swelling in the inguinal region.
- Positive impulse on crying, straining or coughing.
- If no obvious hernial sac (Silk glove sign) sensation of rubbing two pieces of peritoneum indicates thick cord.

Differential diagnosis

- Hydrocele.
- Retractile testis.
- Undescended testis (at SIP).
- Inguinal lymph nodes.

Inguinal hernia

- Infantile hernia occur in about 1-2% of births.
- Incidence 1/ 50 live male births.
- Inguinal hernia in infants need early referral for surgery because of the high incidence of complications.
- Almost one third of premature infants weighing less than 1000 g, will develop a hernia, the risk of incarceration very high during the first six month of life.
- High familial incidence.
- High incidence in boys.
- 60% on the right side.
- 30% on the left side.
- 10% bilateral.

Content

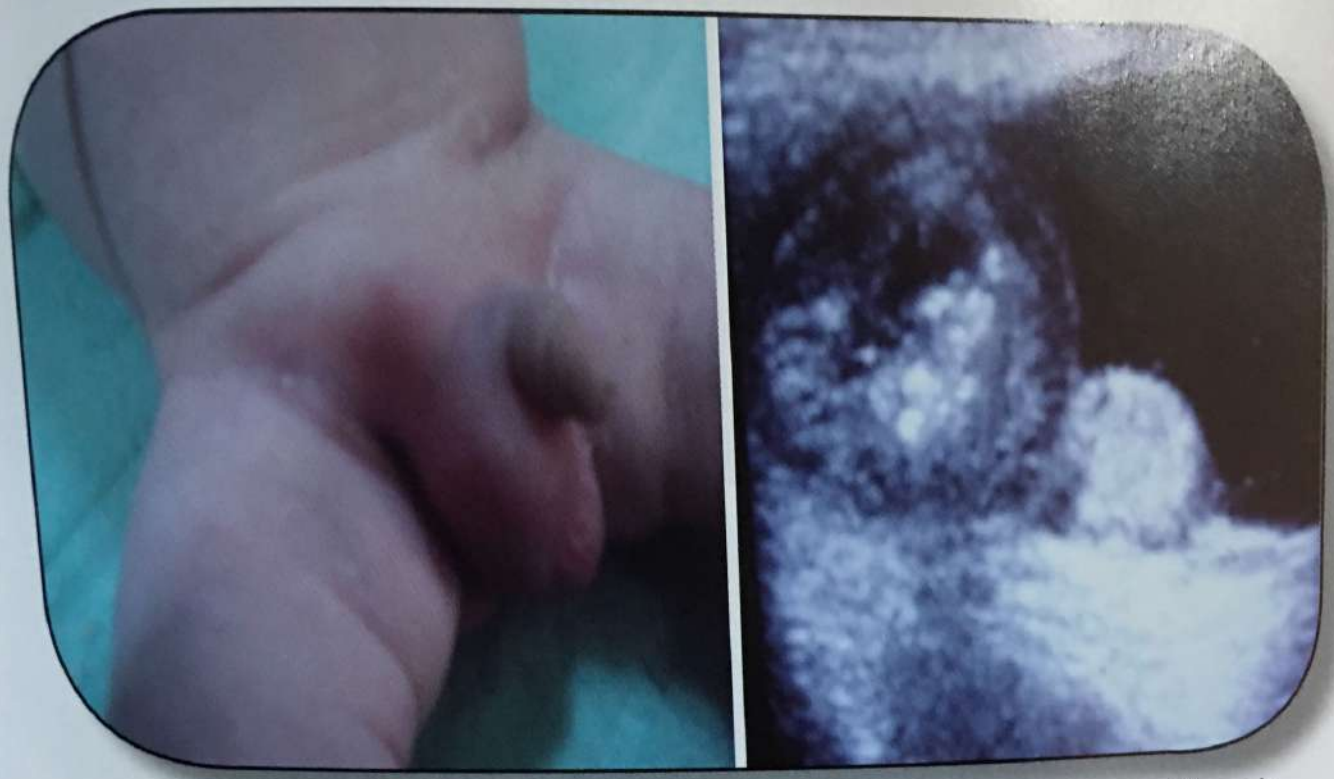
- Loops of small bowel
- Omentum
- Ovary in girls or fallopian tube.

Obstructed Inguinal Hernia

- A loop of small bowel becomes trapped in the hernial sac.
- The obstruction in the sac is almost always at the level of the external ring.
- Obstructed hernias are usually seen in infant under six months of age.

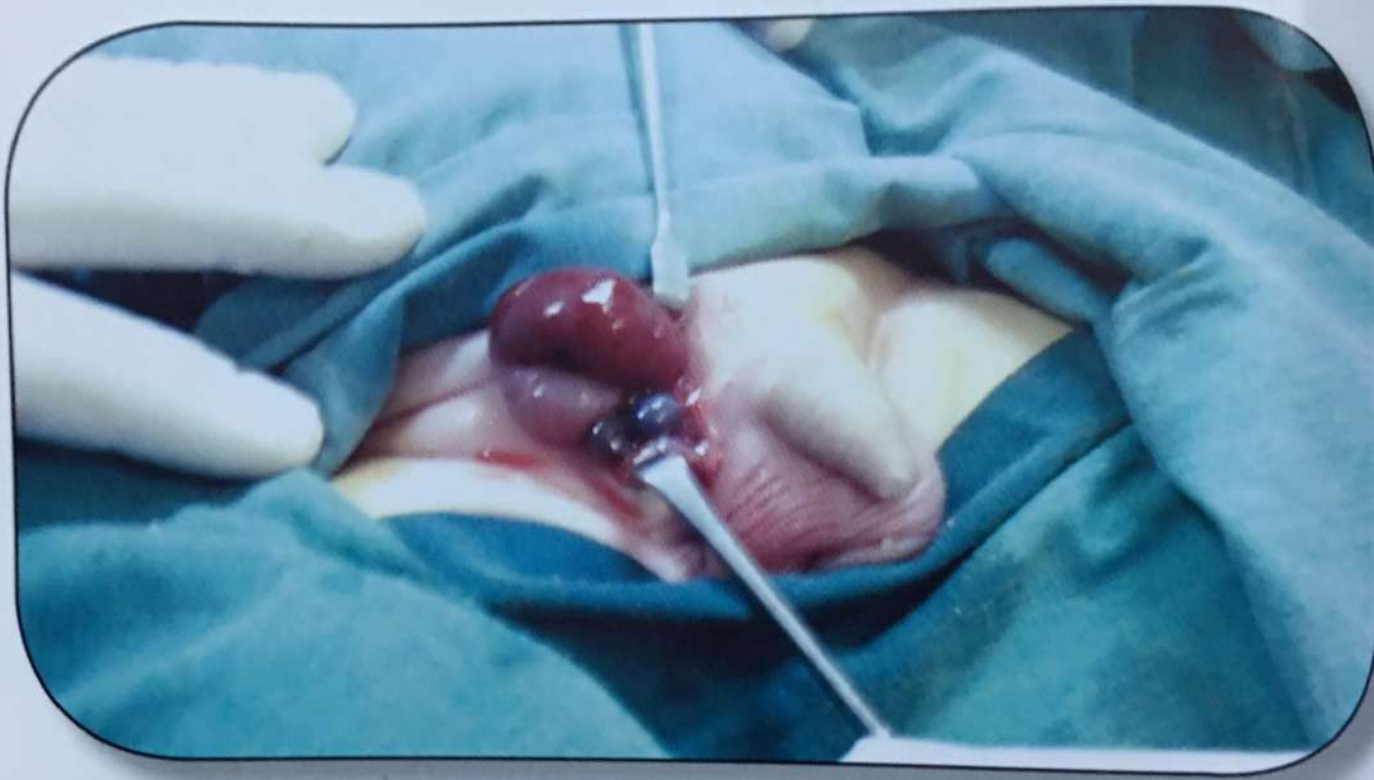
Clinical

- The infant cries lustily.
- Swelling in the groin.
- Tense, tender extends to the external inguinal ring.
- No impulse on crying.
- Progressing to generalize abdominal pain, vomiting and abdominal distension.
- Intestinal obstruction established later.



Strangulated Inguinal Hernia

U/S for strangulated hernia shows entrapped bowel loops



On exploration shows the strangulated loop of bowel & black testis

Strangulated Inguinal Hernia

Differential diagnosis

- Encysted hydrocele of the cord.
- Torsion of an undescended testis.
- Torsion of a fully descended testis (Testis redux), the cremasteric reflex pulls it into the superficial inguinal pouch and fixed by oedema.
- Lymph adenitis (Local inguinal abscess).

Effects

- The testicular vessels can be severely compressed by tense hernia. 15% of baby develop some degree of atrophy.
- Bowel obstruction and strangulation, progress to gangrene and perforation.
- In girls the ovary can be trapped and strangulate.

Incarcerated Inguinal Hernia

Management

* Reduction of the obstructed hernia by " Taxis "

Taxis

* The tip of the fingers are applied to the fundus of the hernia. while the fingertips of the other hand are cupped at the external ring.
* Gentle pressure with relaxing the other fingers reciprocally.
* Taxis is a manipulative trick.
* not a matter of force, while the infant is taking a bottle of feed, or after a sedative and elevation of the legs.
* Avoid reduction en- masse

Successful reduction

* Operation should be performed in 48 hours, to allow oedema of the sac to subside.

Unsuccessful reduction or strangulated hernia.

* Immediate operation

Operation

* Herniotomy

Complications of groin hernia repair

- Bleeding
- Infection <1%
- Injury to cord structures <2%
- Recurrence 0.5 – 1%
- Iatrogenic cryptorchidism.

Undescended Testis

Testis not in scrotum

* **Palpable**	Retractile testis Ectopic testis Undescended testis at (SIP)
* **Impalpable**	Absent testis Dysplastic testis Undescended testis (Intra- abdominal)

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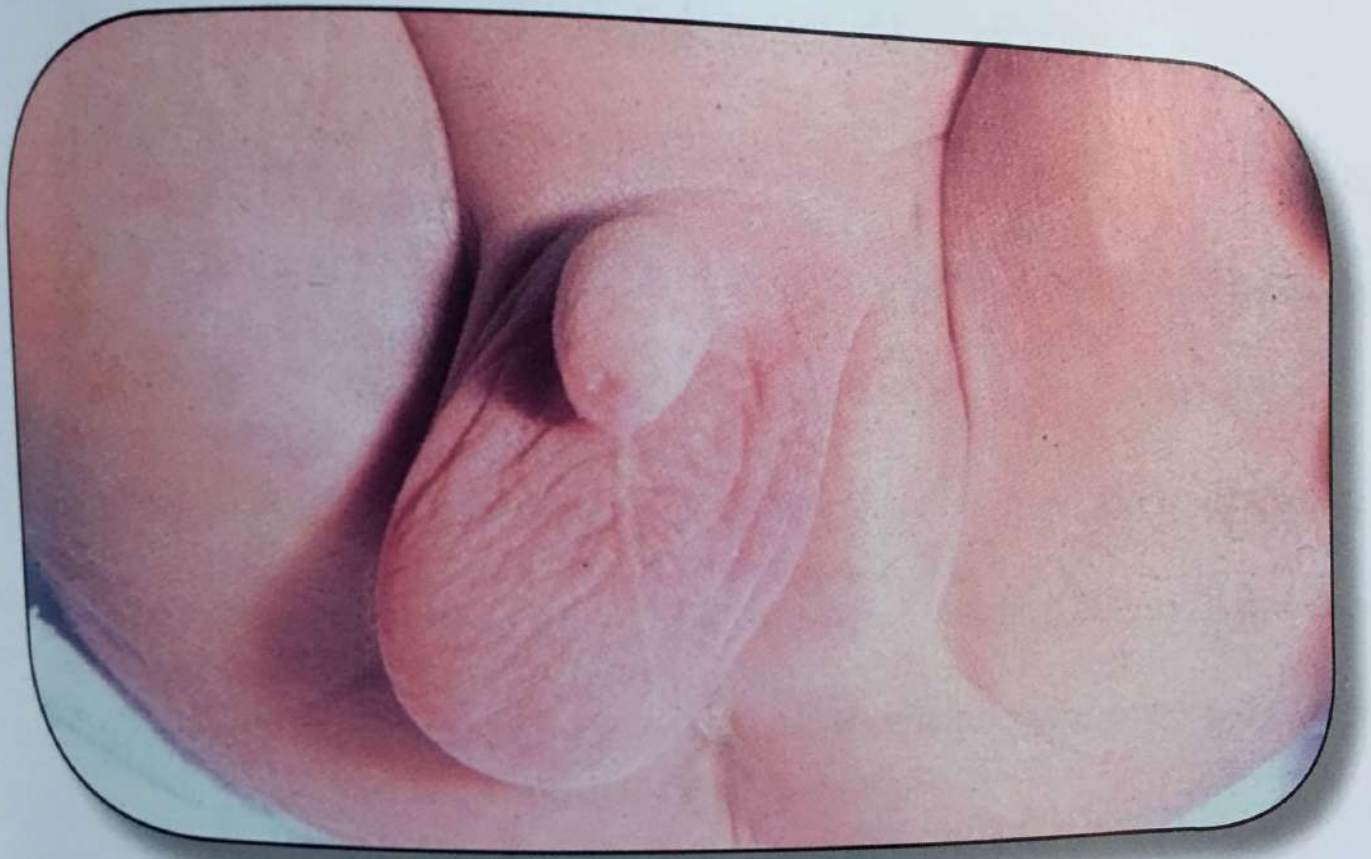
* **SIP:**	Superficial inguinal pouch
* **Anorchia**	Absent testis(agenesis)
* **Dysplastic**	Small and very abnormal testis



Left Undescended Testis

Undescended Testis

Look for

- Associated hernia.
- Ectopic testis.
- Retractile testis.
- Bilateral arrested descent.
- Assess general development.
- Other congenital abnormalities.

Undescended testes

- Can not be made to reach the bottom of the scrotum.
- Has been arrested anywhere along its normal pathway of descent.
- Cryptorchidism: (hidden testis), the testis does not descend into its normal intra scrotal position.
- 90% unilateral, 10% bilateral.
- 70% of unilateral, → in the Rt. Side.
- Incidence in full- term infants, 5% at birth.
  2% by 1 year of age.
- Incidence in premature infants, 25% at birth.
- Site of the testis: At level of pubic tubercle.
  Emergent through the external ring at (SIP).
  In the inguinal canal.
  In the abdomen.
- Relatively immobile with short spermatic cord.

Retractile testis

- Normally descended testis but retracts in to the upper scrotum or groin due to hyper active cremasteric response.
- Can be manipulate the testis down into the scrotum, where it should lie with out tension or restriction.
- Second examination a few months later, to confirm it.
- By increasing age causes the testis to spontaneously reside for longer periods in the scrotal pouch.
- No further intervention is needed.

Ectopic testis

- Accounts for about 10% of extrascrotal testes.
- Descended normally through the inguinal canal but then deviate into unusual sites.
- Normal size testis, and good length of spermatic cord.with no shortage of vascular length.

Site of the ectopic testis

- At the superficial inguinal pouch (facial barrier preventing entery of the testis in to the scrotum).
- Inguino – perineal (extension of the pouch passes behind and lateral to the entrance to the scrotum.
- Perineal (lying fixed between the scrotum and the anus).
- At the base of the penis (prepubic).
- At the thigh (femoral triangle).

Complication of Undescended testis

- Trauma, high risk by direct violence.
- Torsion, due to abnormal testis.
- Tumour: increase in risk than in general population.
- Poor function (Spermatogenesis).
- 90% of men achieved fertility if their orchidopexy had been performed before 2 years of age.

Management of undescended testes

Diagnosis

- Clinical information.
- Ultrasound, Ct, and MRI.
- Laparoscopy,

Treatment

- Orchidopexy is best performed at 6 – 24 months of age.
- To repair an associated hernia.
- To improve future fertility.
- To place the testis in an easily palpable position.
- To afford cosmetic and psychological benefit.

- 10 – 20% of undescended testes are associated with a clinical Inguinal hernia, the orchidopexy can be done at the same Time however young the child is.

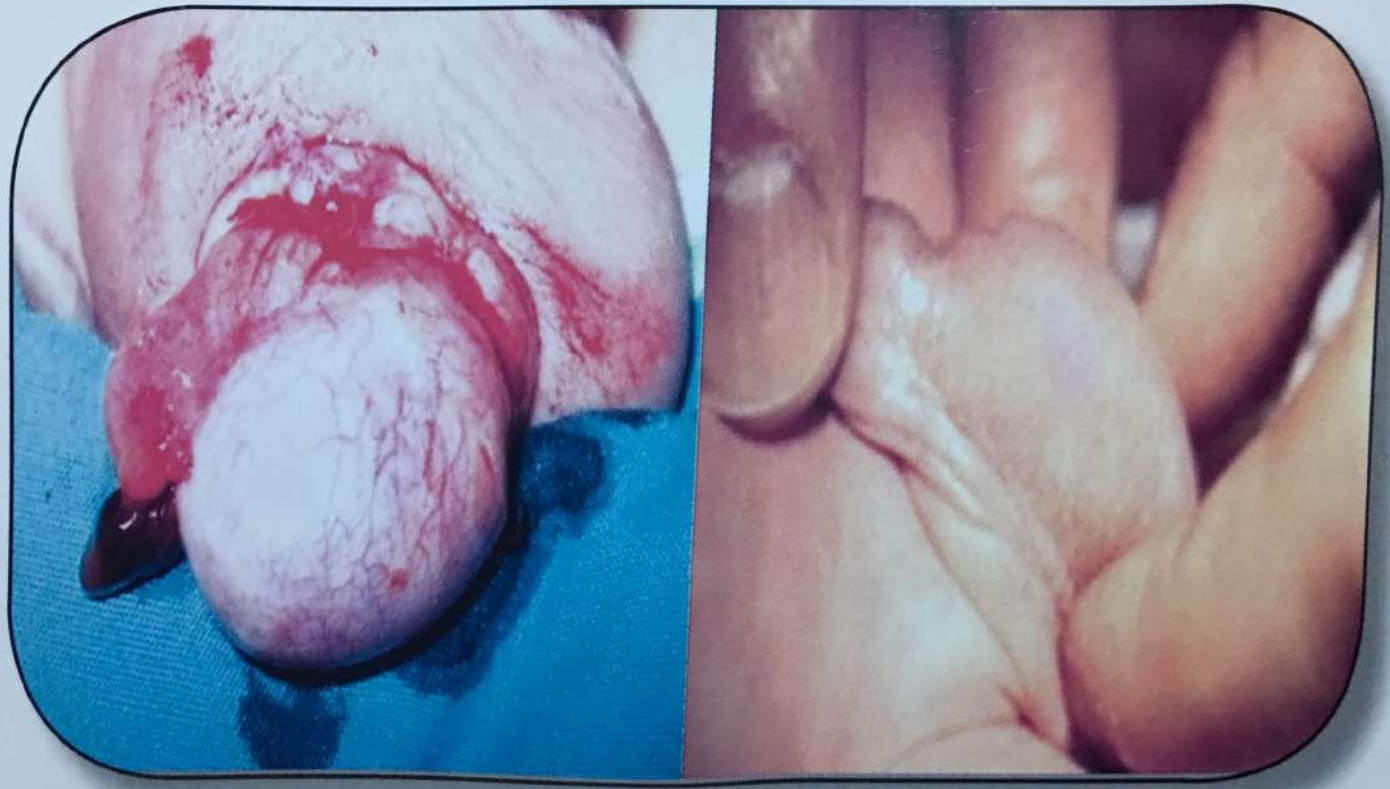
Acute Scrotum

Clinical feature

- Scrotal pain.
- The child refuse to walk.
- Abnormal gait with abducted thighs.

Causes

- Obstructed inguinal hernia.
- Torsion of the testis.
- Torsion of one of its appendages" hydatid of Morgagni "
- Epididymo – orchitis.
- Idiopathic scrotal oedema.
- Inguinal lymph adenitis.



Operative finding

Blue dot discoloration in the scrotum

Torsion of the testicular appendages

Testicular Torsion

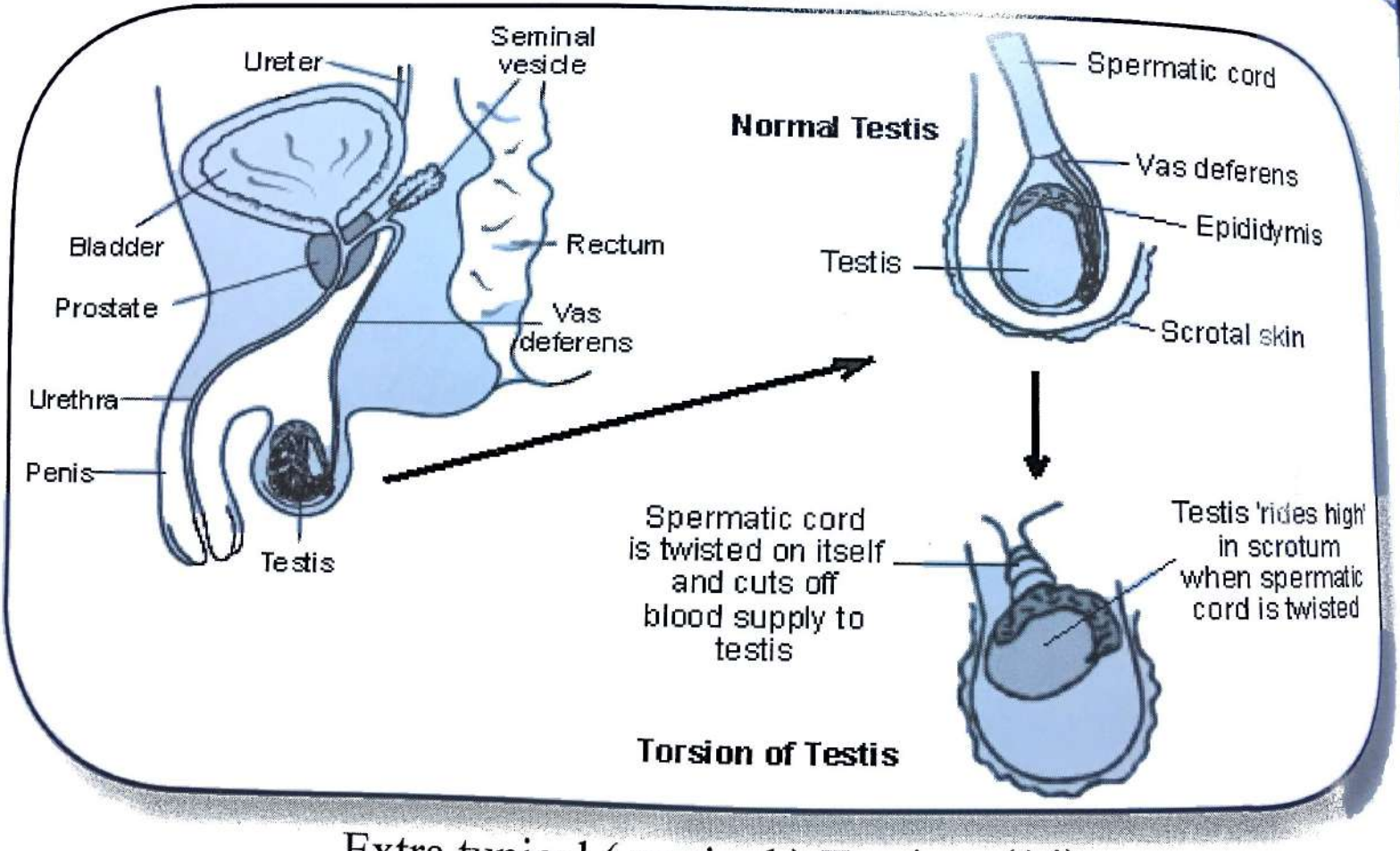
- Twists upon the spermatic cord,
- Causing venous congestion and oedema,
- Leads to arterial obstruction and form gonadal necrosis.
- Incidence 1/ 4000 male.
- The commonest cause of an acute scrotum in all age groups.
- Most cases occur in late childhood or early adolescence.
- predisposing abnormality is almost always present.

Types

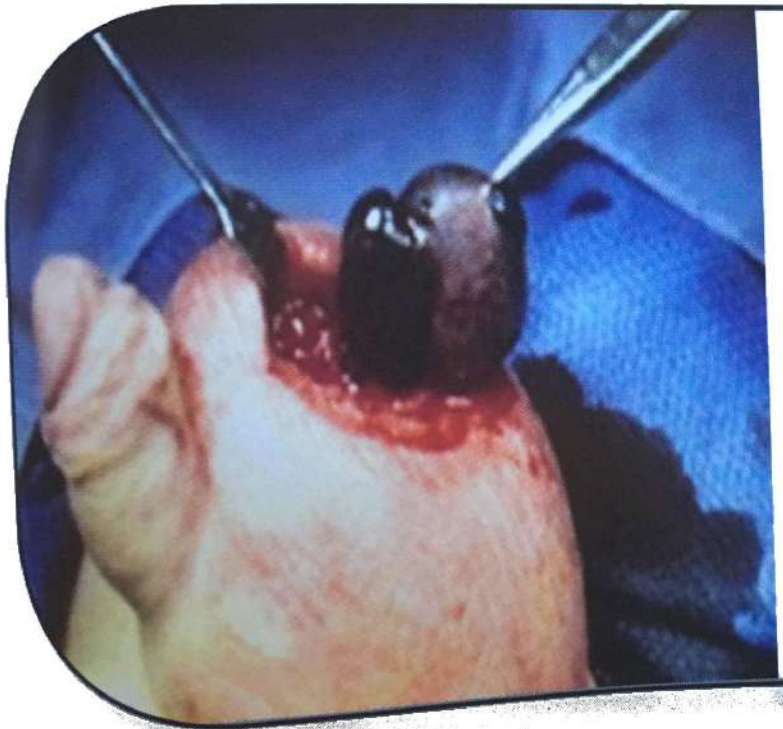
- Intra tunical (vaginal).
- Extra tunical (vaginal).

Clinical

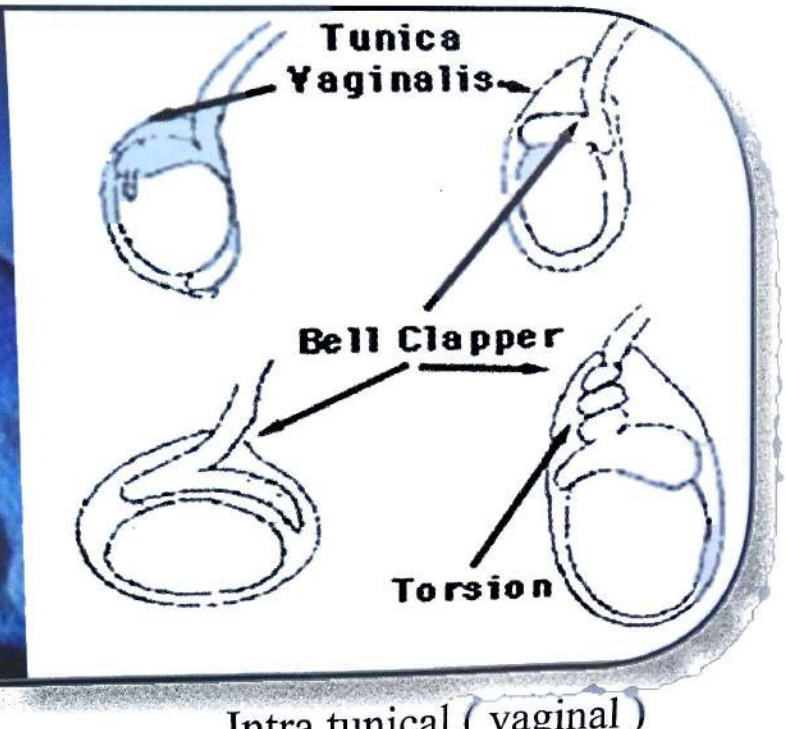
- Sudden onset of pain in the scrotum and lower abdomen.
- Acute unilateral scrotal swelling.
- Palpation of the spermatic cord, reveal thickend or twisted.
- The testis is elevated within the hemiscrotum.



Extra tunical (vaginal) Torsion. (14)



Testicular Torsion
Gangrenous testis
Operative finding



Intra tunical (vaginal)
Torsion (14)

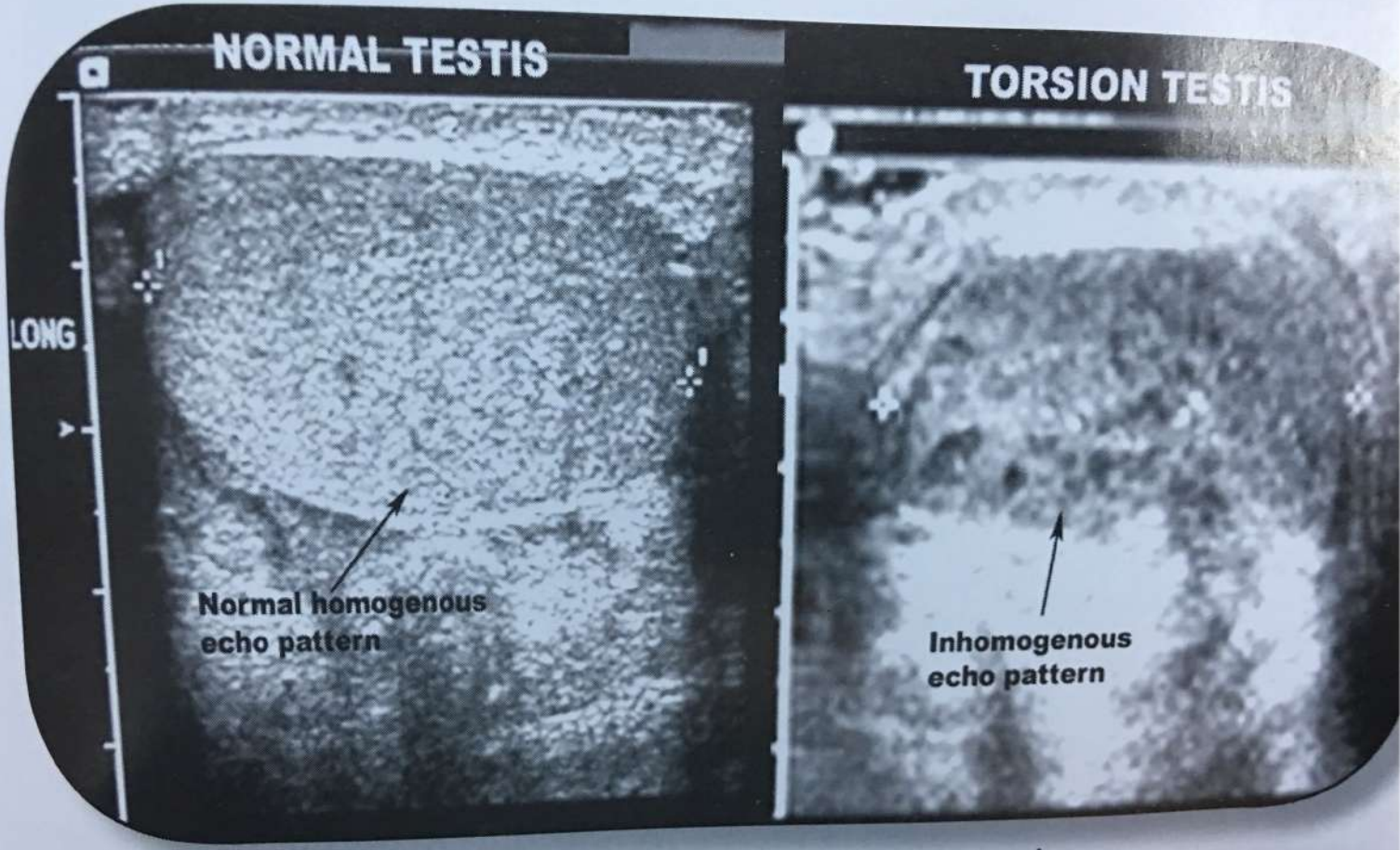
Testicular Torsion

Diagnosis

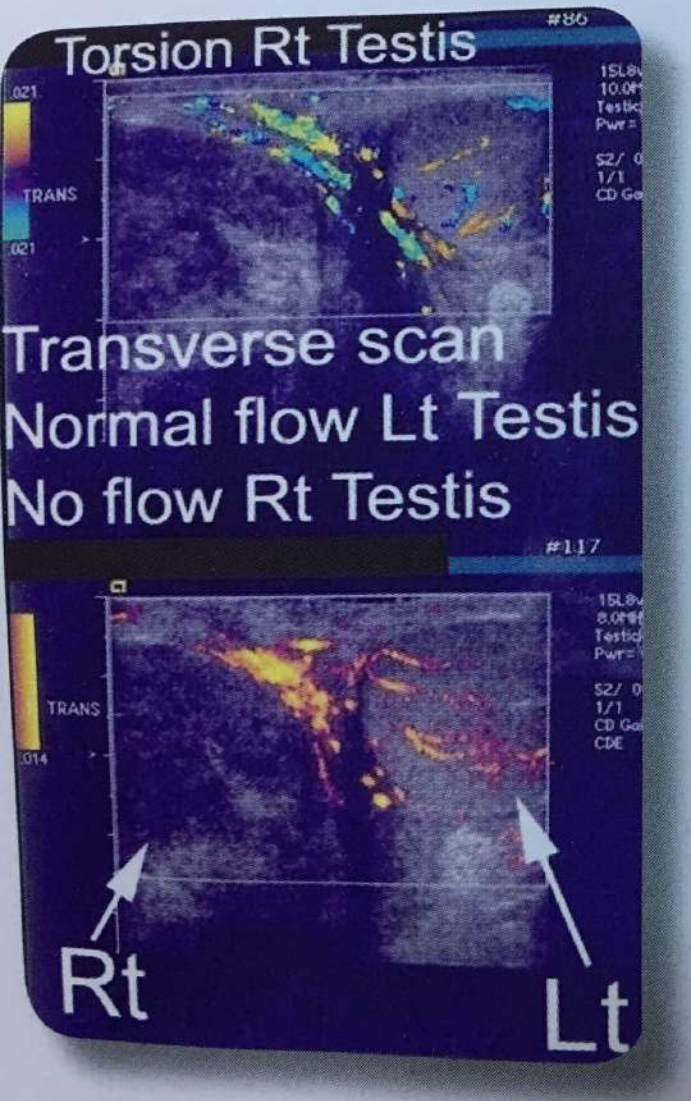
- Clinical information.
- Ultrasonography with color Doppler
- Nuclear isotope testis scan.

Treatment

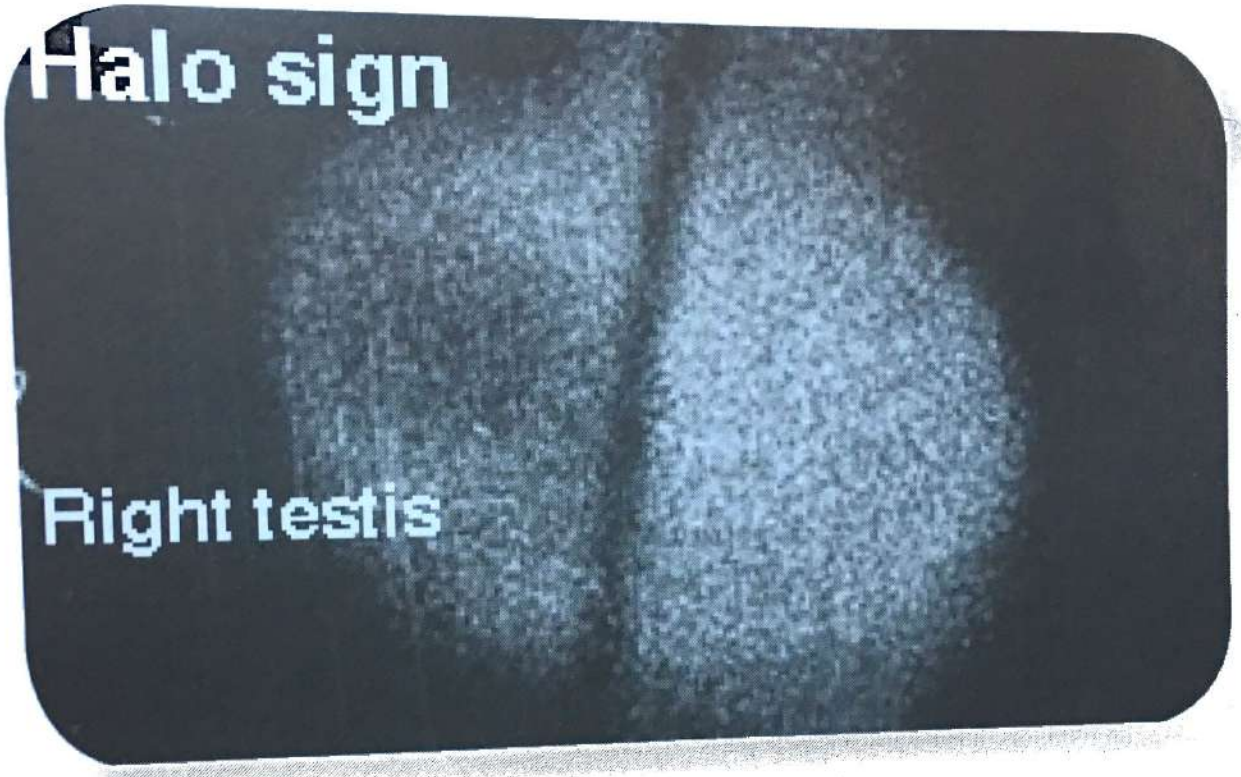
- Urgent treatment, should not be delayed.
- urgent exploration is required.
- Always open to doubt.
- Maximal success rate are obtained when surgery is performed within 10 hours of the incidence.
- Healthy testis must be fixed to prevent recurrence.
- The sound testis should also be fixed to prevent torsion.



Ultrasound for the testicular torsion



Color Doppler Shows the blood flow



Nuclear isotope testis scan
Rt.dark gray area
Represent a testis
With impaired Perfussion.
(It does not take up The isotope)

Important Notes For The Resident

Inguinal Hernia

- Diagnosis, work-up and usual labs.
- Pre-op Doppler US of testes if has been obstructed or strangulated.
- pre-op preparation infant need to be stabilized.
- Post-op care, for day care surgery.

Undescended Testis

- If it is associated with inguinal hernia orchidopexy can be performedat the same time of herniotomy even in the newborn.
- Retractile testis, : If the testis could be brought down in to the scrotum and stays there does not need surgery.
- Palpable undescended testis is treated by orchidopexy.
- Non-palpable testis should have laparoscopic exploration.

Abdominal Masses In Children

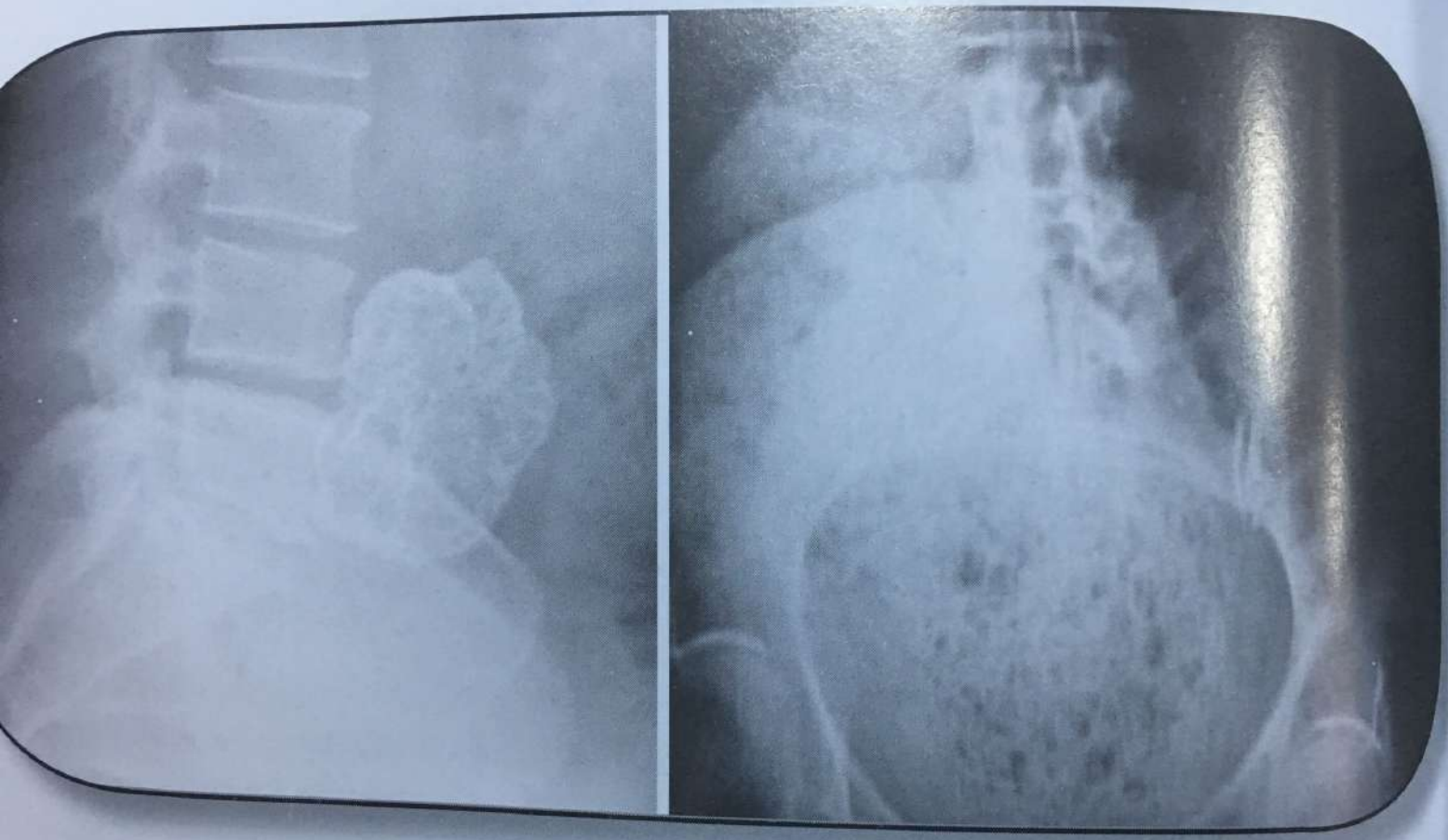
Clinical diagnosis

Information : Site
Size
Consistency
Mobility

1- The probable organ of origin.
2- The age of the patient.
3- The length of the history.
4- The type of symptoms.

The commonest abdominal masses in children.

- The liver (below the costal margin until the 3-4 years).
- Faecal impaction.
- Full bladder.



Faecal impaction

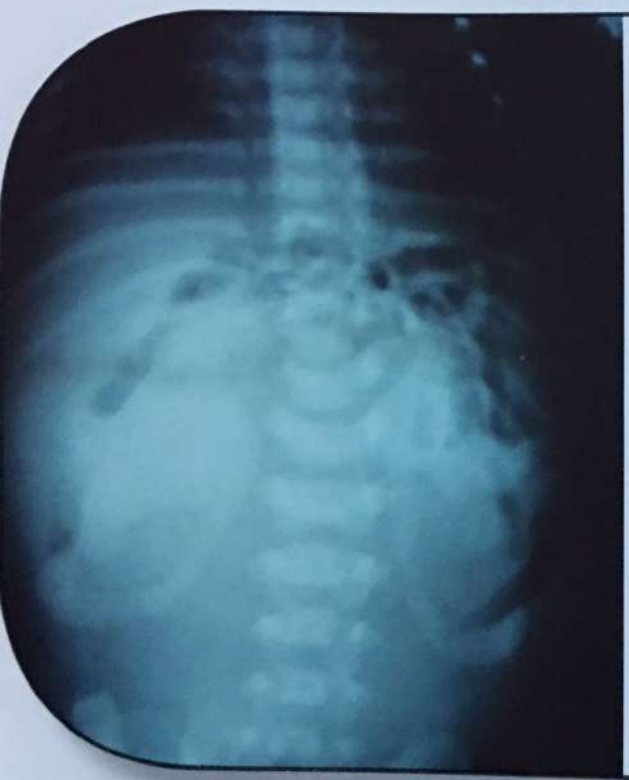
Abdominal Masses In Children

Palpable Mass – Related to GIT.

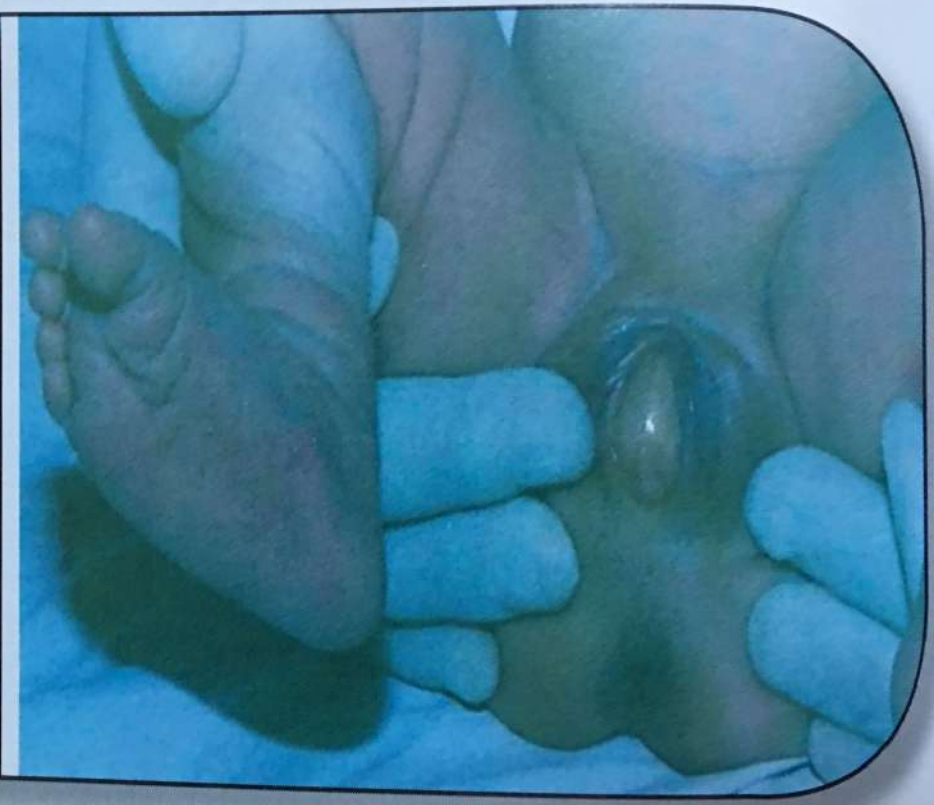
1- Appendicular mass.
2- Congenital hypertrophic pyloric stenosis.
3- Intussusception sausage shaped mass.
4- Volvulus, tense loop of bowel.
5- Entrogenous cyst, type of duplication.
6- Intestinal lymphoma.
7- Crohn`s disease.

Lower abdominal mass in girls.

1- Imperforate hymen. (Hydrocolpos, Haemocolpos)
2- Ovarian cyst.
3- Ovarian tumor.



Hydrocolpos X-ray
Soft tissue mass raise from pelvis



Imperforate hymen

Abdominal Masses In Children

Right subcostal – Related to the liver.

1- Hepatomegaly (Cirrhosis) – (Hepatitis).
2- Biliary atresia.
3- Choledochal cyst.
4- Hydatid cyst.
5- Hepatoblastoma.

Left subcostal – Related to the spleen.

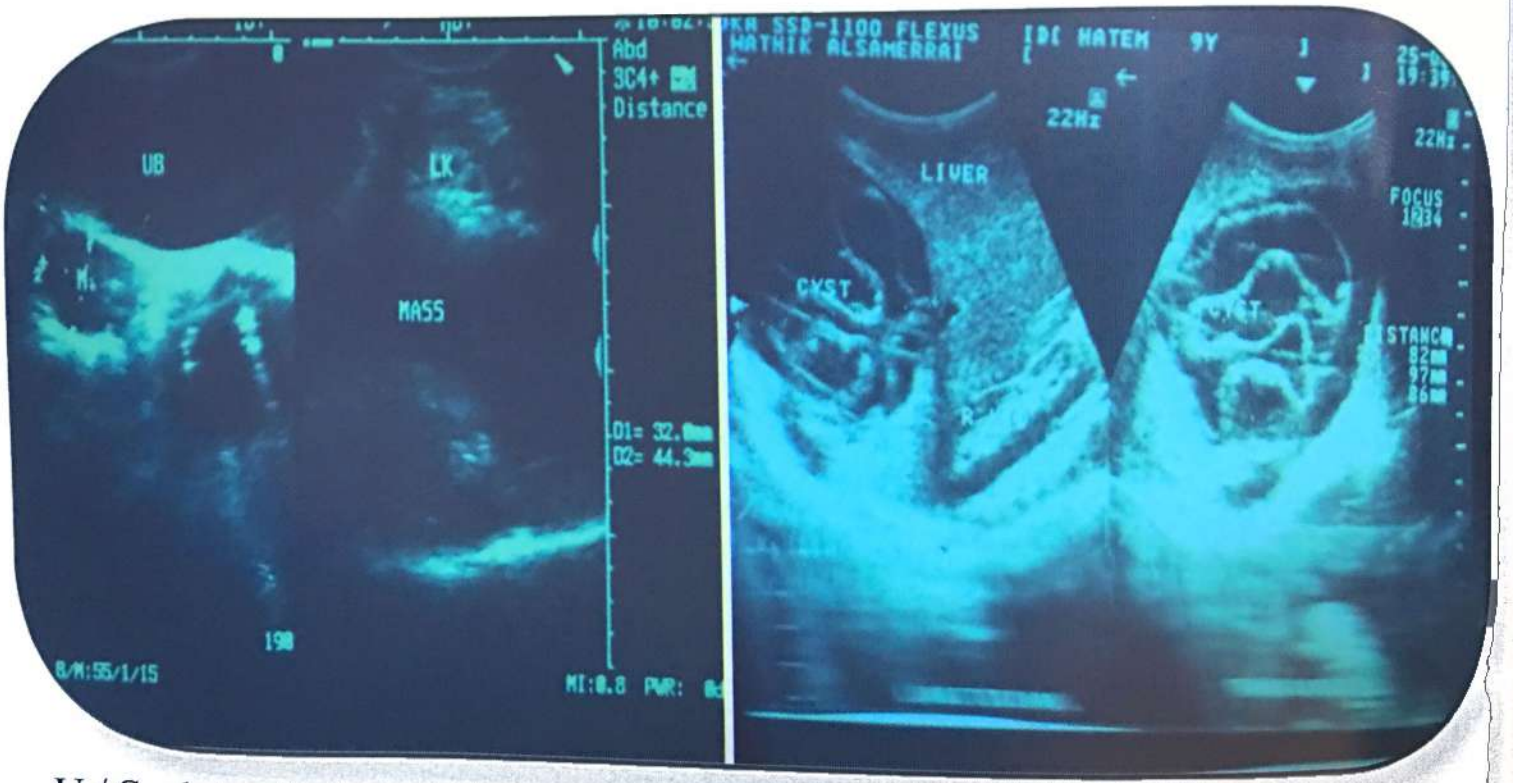
1- Splenomegaly.
2- Hydatid cyst.

Mass in the loin – Related to GU system.

1- Wilms' tumour.(Nephroblastoma)
2- Hydronephrosis.
3- Multicystic kidney.

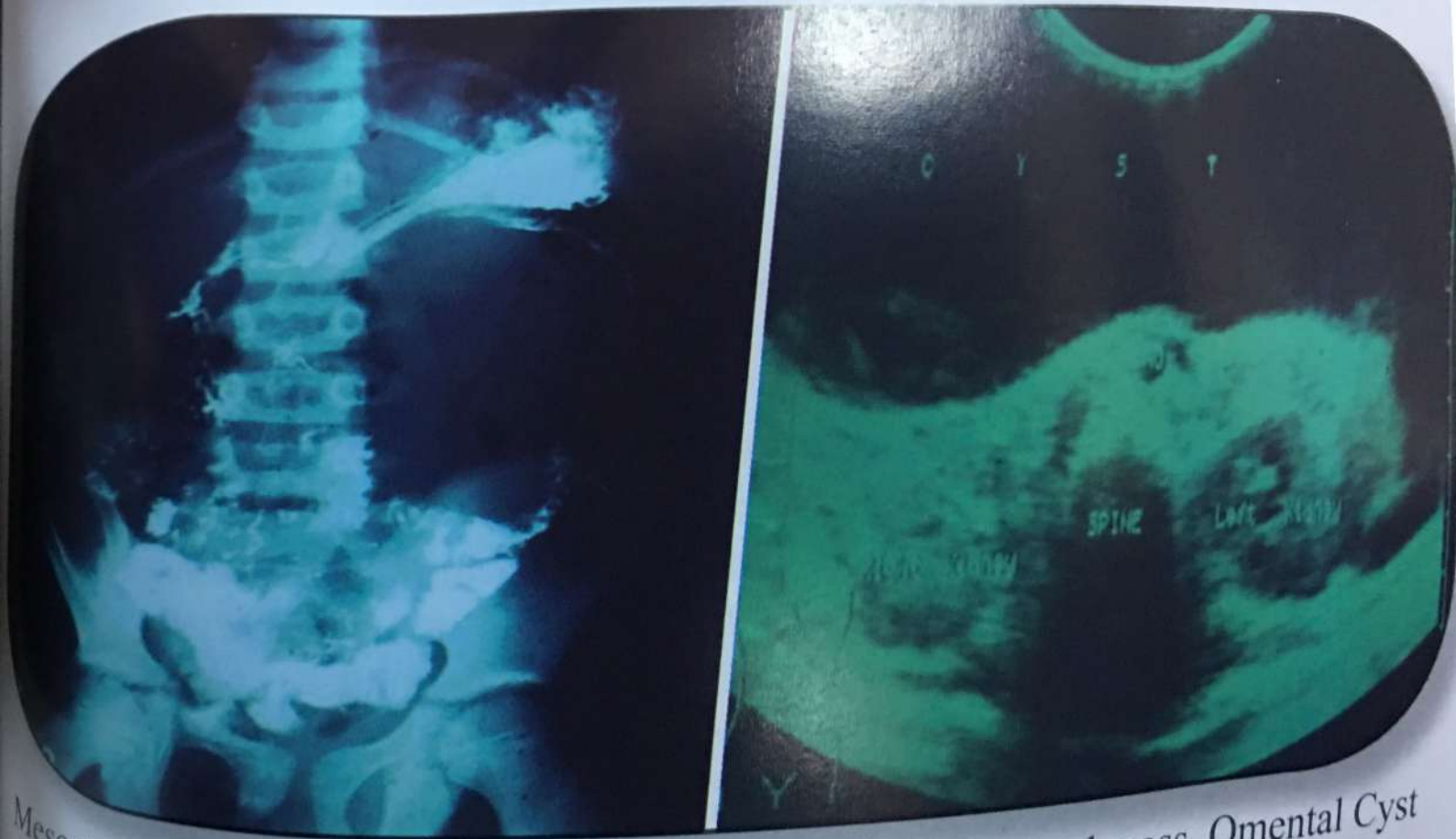
Others.

1- Neuroblastoma.
2- Retroperitoneum teratomas.



U / S, abdominal mass (Lymphoma)

U / S Hydatid cyst in the liver



Mesenteric mass as shown by barium U / S ,Abdominal mass *Omental Cyst*

Abdominal Masses In Children

Clinical Feature and Imaging.

- The mass itself is usually the presenting feature.
- Typically is discovered by the mother while drying the child`s abdomen after a bath.
- Palpation should be restricted to the minimum to reduce the risk of metastasis.
- Plain film of the abdomen may show calcification within the soft tissue mass, displacement of bowel loops.
- Ultrasound, is useful in identifying hydronephrosis and other cystic, multilocular cysts or solid mass and where it`s originated.
- Intravenous pyelography, useful in demonstrating the calyceal distortion and the function in the contralateral kidney.
- Barium study, useful when the mass originated in the GIT.
- C.T (Computed Tomography) shows the extension of the mass.
- MRI (Magnetic Rosonance Imaging) shows the extension of the tumor such as spinal canal or the metastasis to the intra- vascular.
- Bone scan to diagnose the bone metastasis.

Abdominal Masses In Children

Nephroblastoma (Wilms Tumour)

- Originates from the primitive embryonic cells.
- Pathologically contains renal tissue with various degrees of differentiation.
- Produces a mixed histological picture of epithelial structures.
- Resembling tubules and a variety of mesenchymal tissues.
- Affects about 1 in 10,000 live births.
- 60% present before the age of three years.
- 10% tumours are bilateral.
- 90% presented as abdominal mass.
- Diagnosis can be confirmed by Ultrasound and CT scan.
- 40% have metastatic spread at presentation but do not prevent cure.
- Treatment is with nephrectomy and postoperative chemotherapy and radiotherapy
- Stage 1 (localized to kidney) has 3 years survival of >90% and cure rate is 90%.
- Stage 4 (haematogenous spread) has 3 years survival less than 30%.

Children's Oncology Group (COG) Staging System
Wilms Tumor

Stage I: The tumor was contained within one kidney and was completely removed by Surgery, the renal capsule was not broken during surgery.

Stage II: The tumor has grown beyond the kidney, but it was completely removed by Surgery without any apparent cancer left behind. Lymph nodes do not contain Tumor.

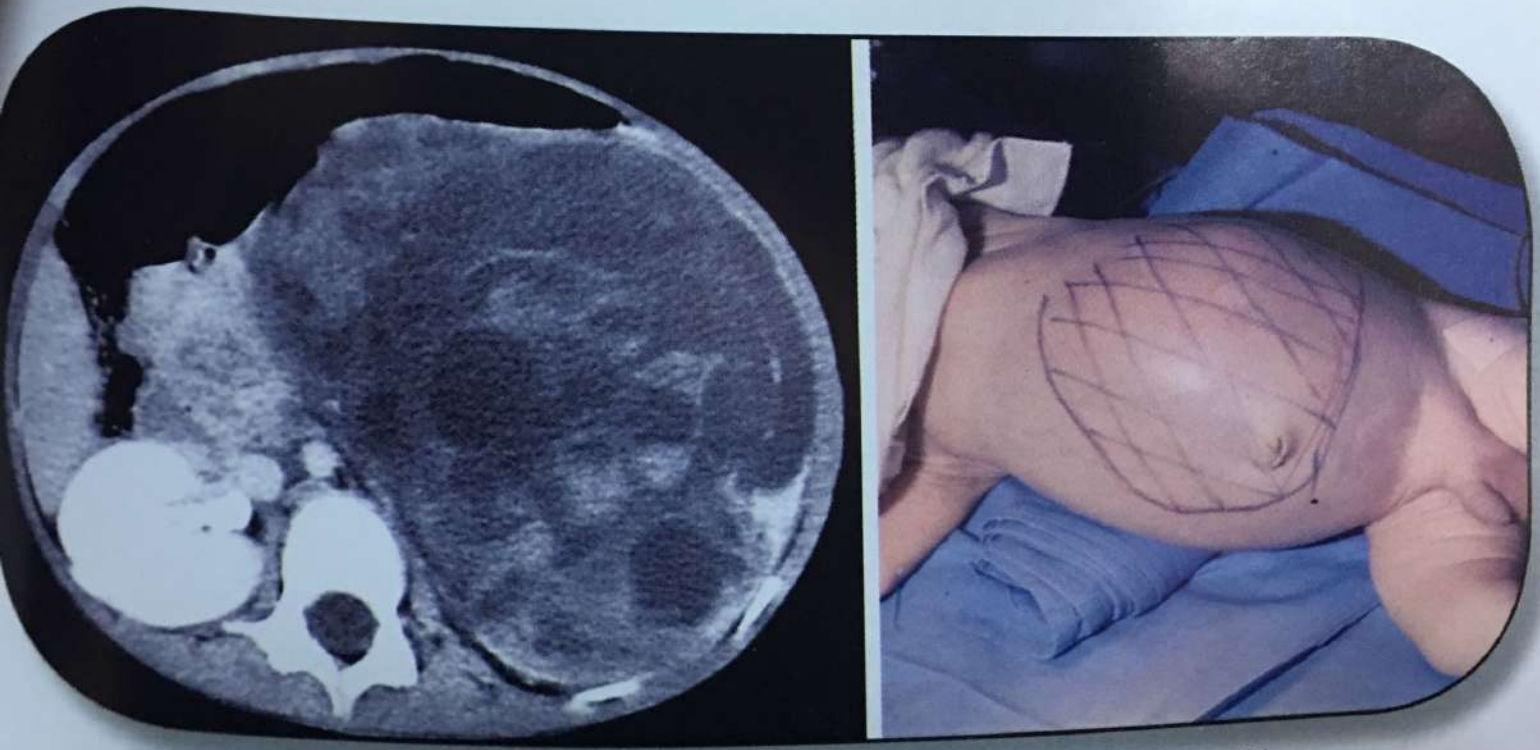
Stage III: Wilms tumors that may not have been completely removed. the cancer remaining after surgery is limited to the abdomen.

One or more of the following features.

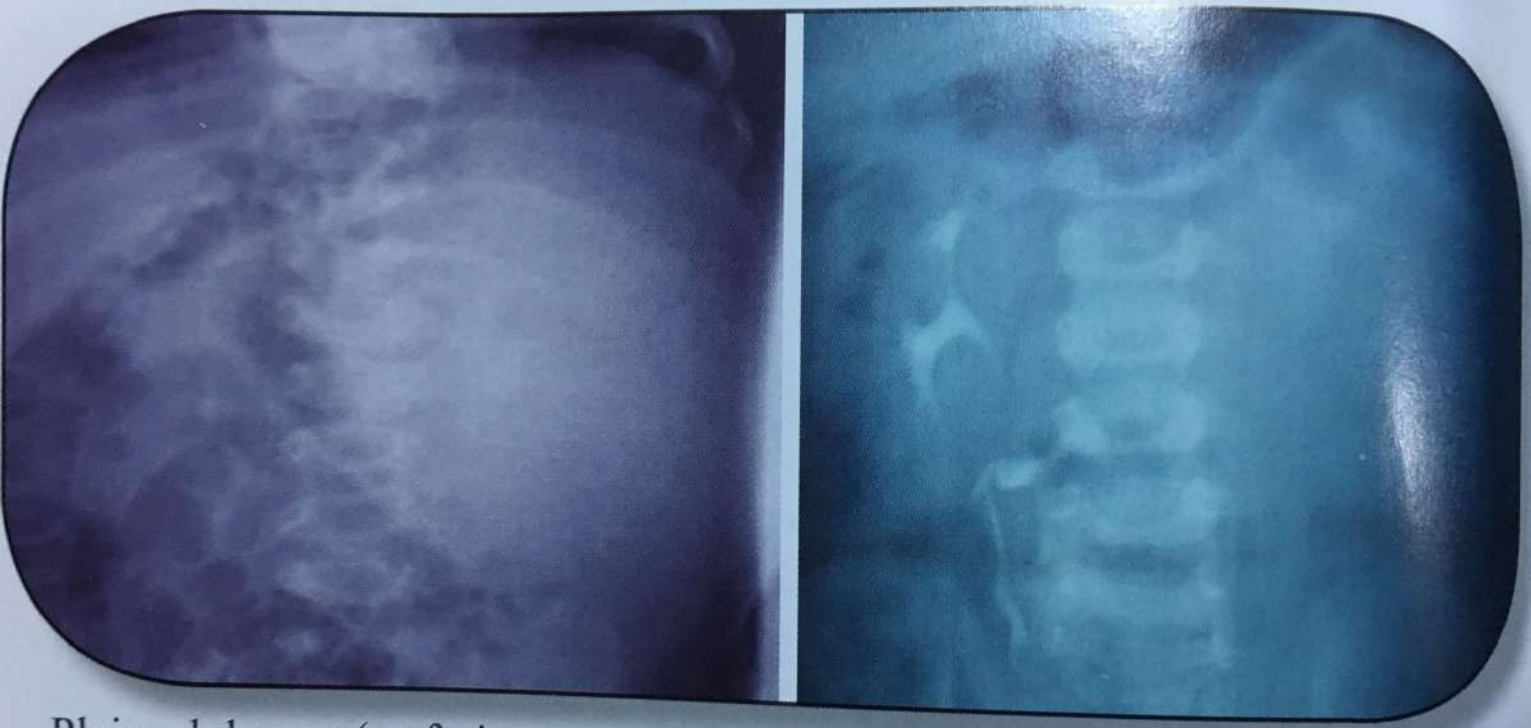
- The cancer has spread to lymph nodes in the abdomen or pelvis.
- The cancer has invaded nearby vital structures.
- Deposits of tumor are found along the lining of the abdominal space.
- Cancer cells are found at the edge of the sample removed by surgery.
- The cancer spilled into the abdominal space before or during surgery.
- The tumor was removed in more than one piece.

Stage IV: The cancer has spread through the blood to organs away from the kidneys such as the lungs, liver, brain, bone, or to lymph nodes far away from the kidneys.

Stage V: Tumors are found in both kidneys at diagnosis.

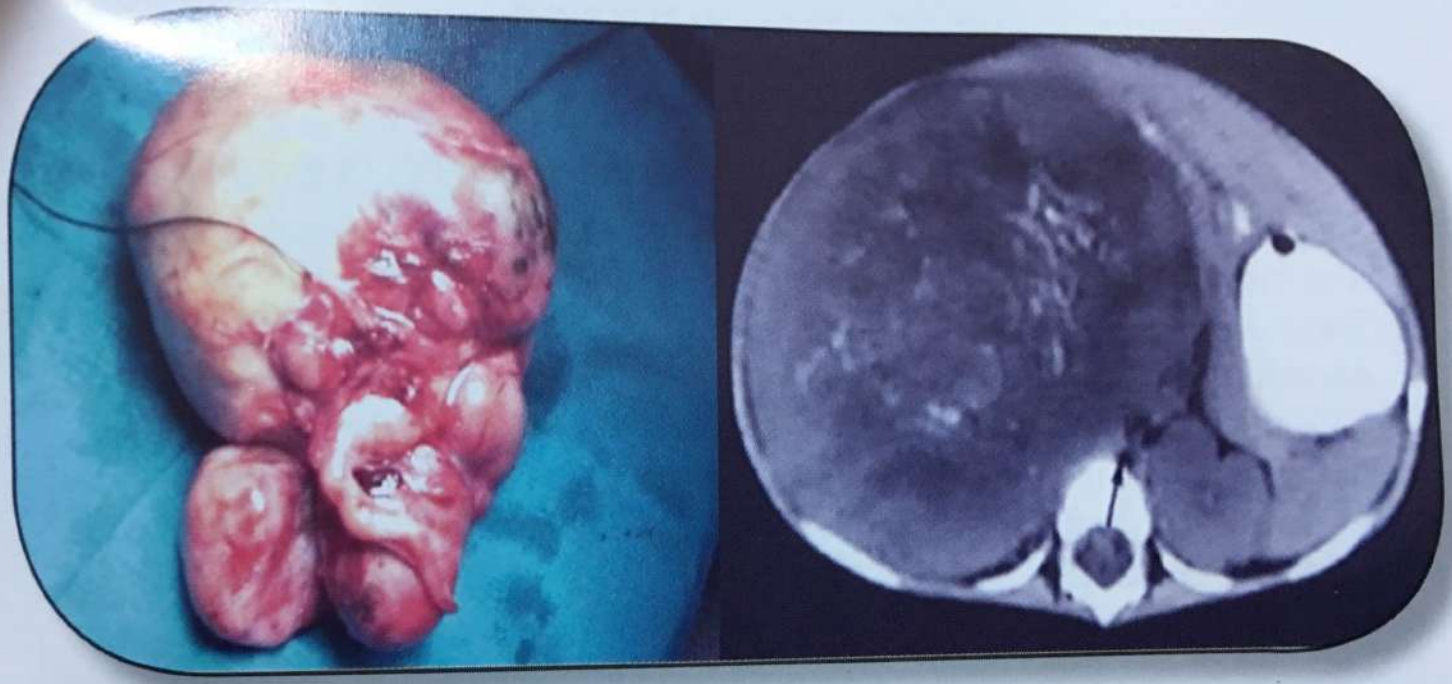


CT scan for huge Wilms tumour crosing the midline



Plain abdomen (soft tissue mass)
Retroperitoneal displaced the bowel

IVP, distortion left kidney
(Wilms Tumour)



Operative Specimen CT Scan

Nephroblastoma (Wilms Tumour)

Abdominal Masses In Children

Neuroblastoma

- Arises from neural crest tissue – usually adrenal medulla or sympathetic ganglia.
- The most highly malignant of infancy and early childhood.
- Show a range of malignancy from benign ganglioneuroma to malignant neuroblastoma.
- 75% are abdominal.
- Affects about 1 in 8 000 live births.
- Usually occur in first five years of life.
- Clinical presentation depends on site of tumour and presence of metastases.
- Bone and pulmonary metastases are relatively common.

International Neuroblastoma Staging System (INSS)

1- On one side of the body,
- All visible tumor is totally removed by surgery.
- Lymph nodes out side the tumor are free.

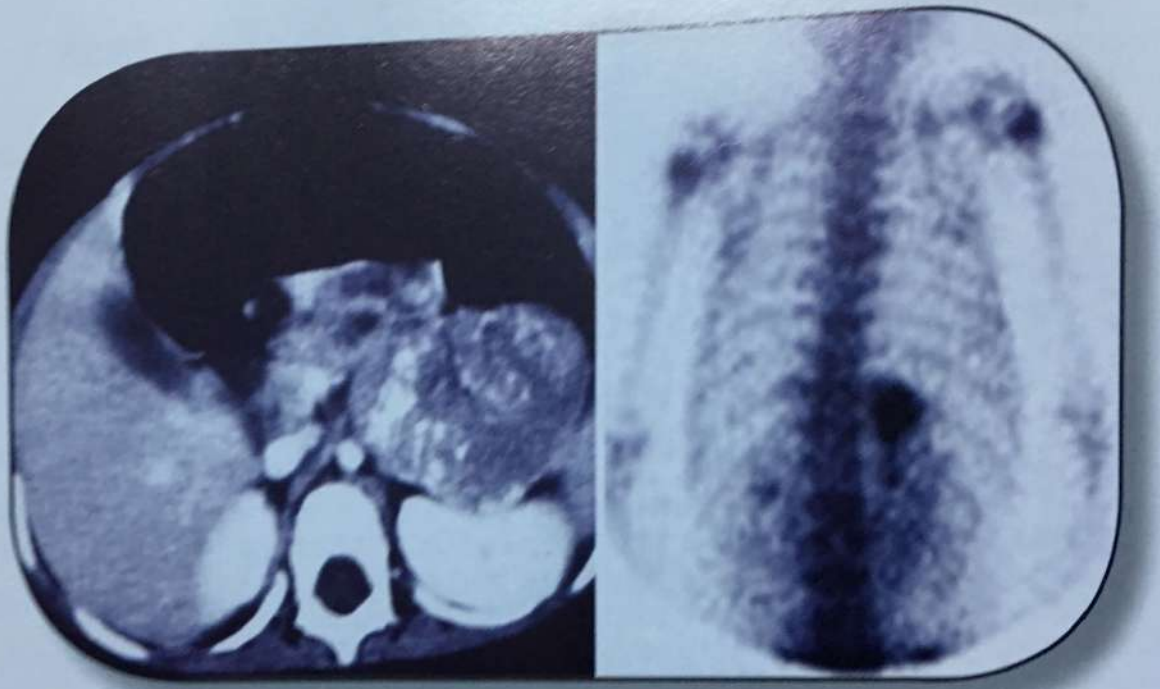
2A- On one side of the body.
- Not all the visible tumor can be removed.
- Lymph nodes out side the tumor are free.

2B- On one side of the body.
- May or may not be able to be totally removed.
- Lymph nodes out side the tumor are involved.
- Other sides of the body or elsewhere are free.

3- The cancer has not spread to distant parts of the body.
One of the following is true.
1- Can not be completely removed, crossed the midline.
2- It has spread to lymph nodes on the other side of the body.
3- Tumor is in the middle of the body and growing toward
Both sides directly or by spreading to lymph nodes.

4- Spread to distant site, lymph nodes, bone, liver, skin, bone marrow.

4S- (Special neuroblastoma)
- Child younger than 18 months old.
- On one side of the body.
- May spread to lymph node on the same side of the body.
- Spread to the liver, skin and or the bone marrow.



CT scan Positive bone scan

Neuroblastoma

Abdominal Masses In Children

Neuroblastoma

- **Symptoms** often due to metastases, such as pallor and weight loss.
- 30% presented as abdominal mass.
- 90% have increased urinary VMA and MHMA.
- Plain abdominal x- ray often shows diffused speckled calcification.

- **Diagnosis** can be confirmed by ultrasound and CT scan.
- **Treatment** with surgery and post-operative radiotherapy.
- **Prognosis** is best in children presenting before 2 years of age.
- Stage 1 (localised) has 3 years survival of > 90%.
- Stage 4 (haematogenous spread) has 3 years survival less than 30%.

Abdominal Masses In Children

Facts about hydronephrosis

- It is four to five times more common in males than females.
- It can occur in one or both kidneys.
- Most mild cases and even some moderate case may resolve on their own.
- More severe cases may require surgery.

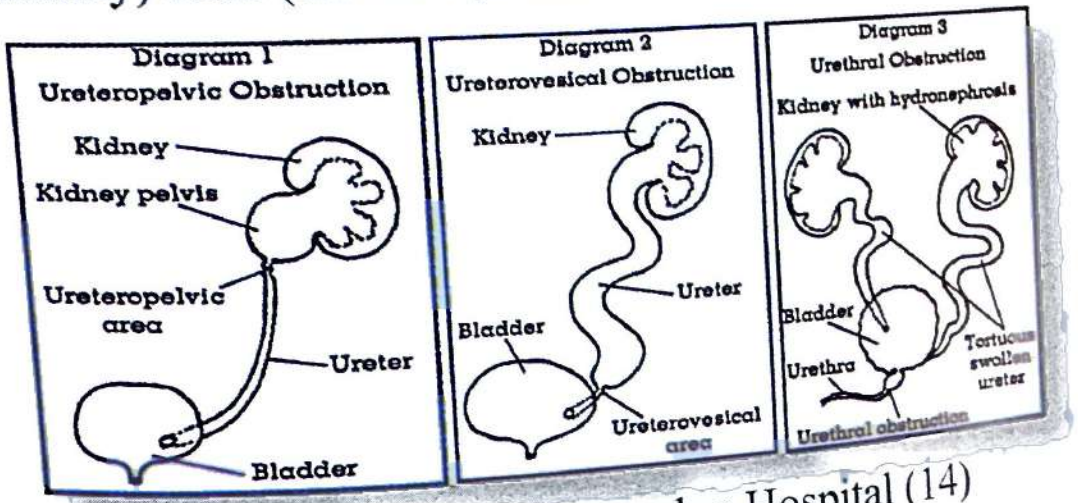
Common conditions responsible for hydronephrosis

- Uretero-pelvic junction obstruction (obstruction where kidney and ureter meet).
- Vesico-ureteral reflux (backwash of urine).
- Posterior urethral valves (abnormal flaps of tissue in the urethra).
- Ectopic ureter (abnormal opening of ureter).
- Ureterocele (a cystic or balloon-like end of the ureter that obstruct the ureter).

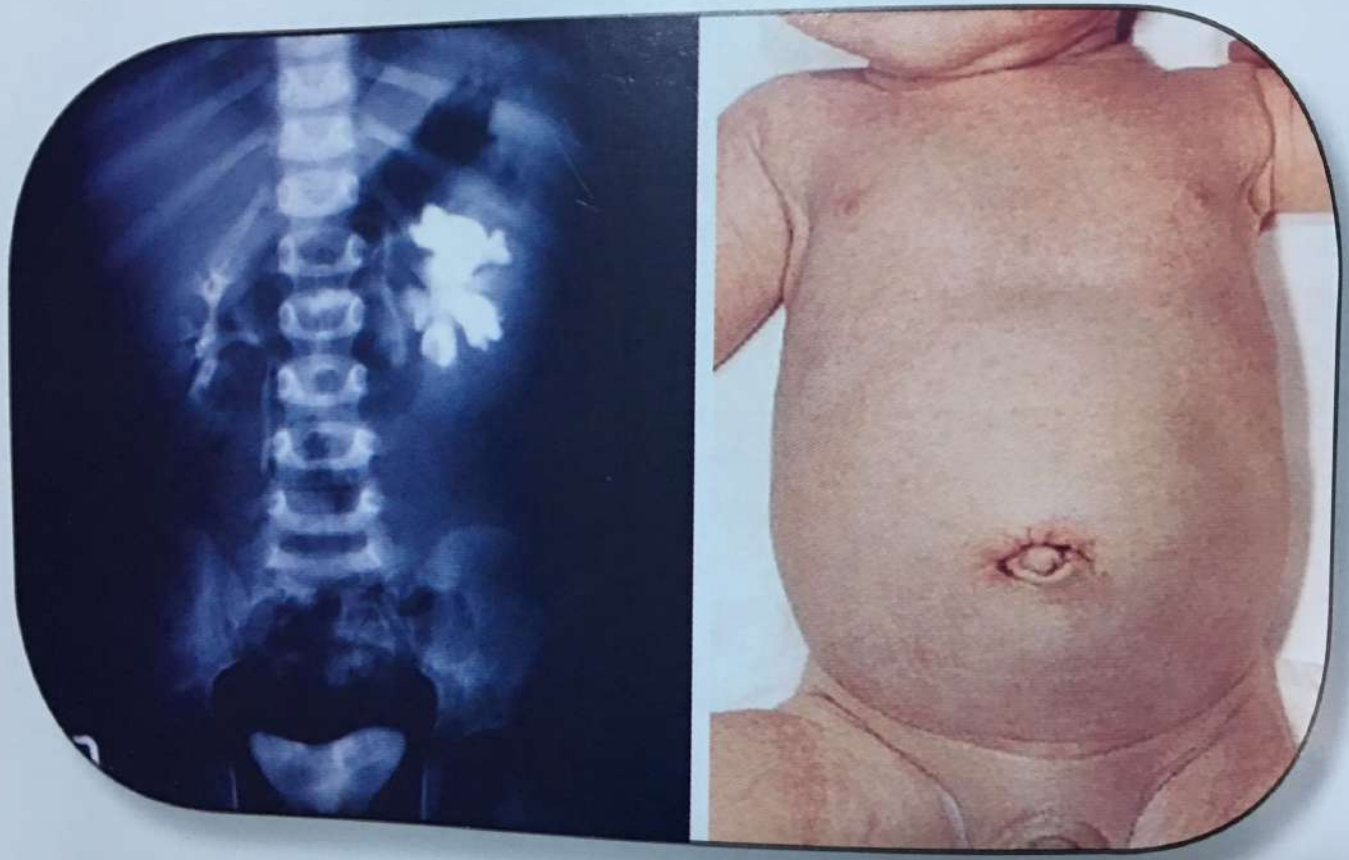
Abdominal Masses In Children

Diagnosis of hydronephrosis

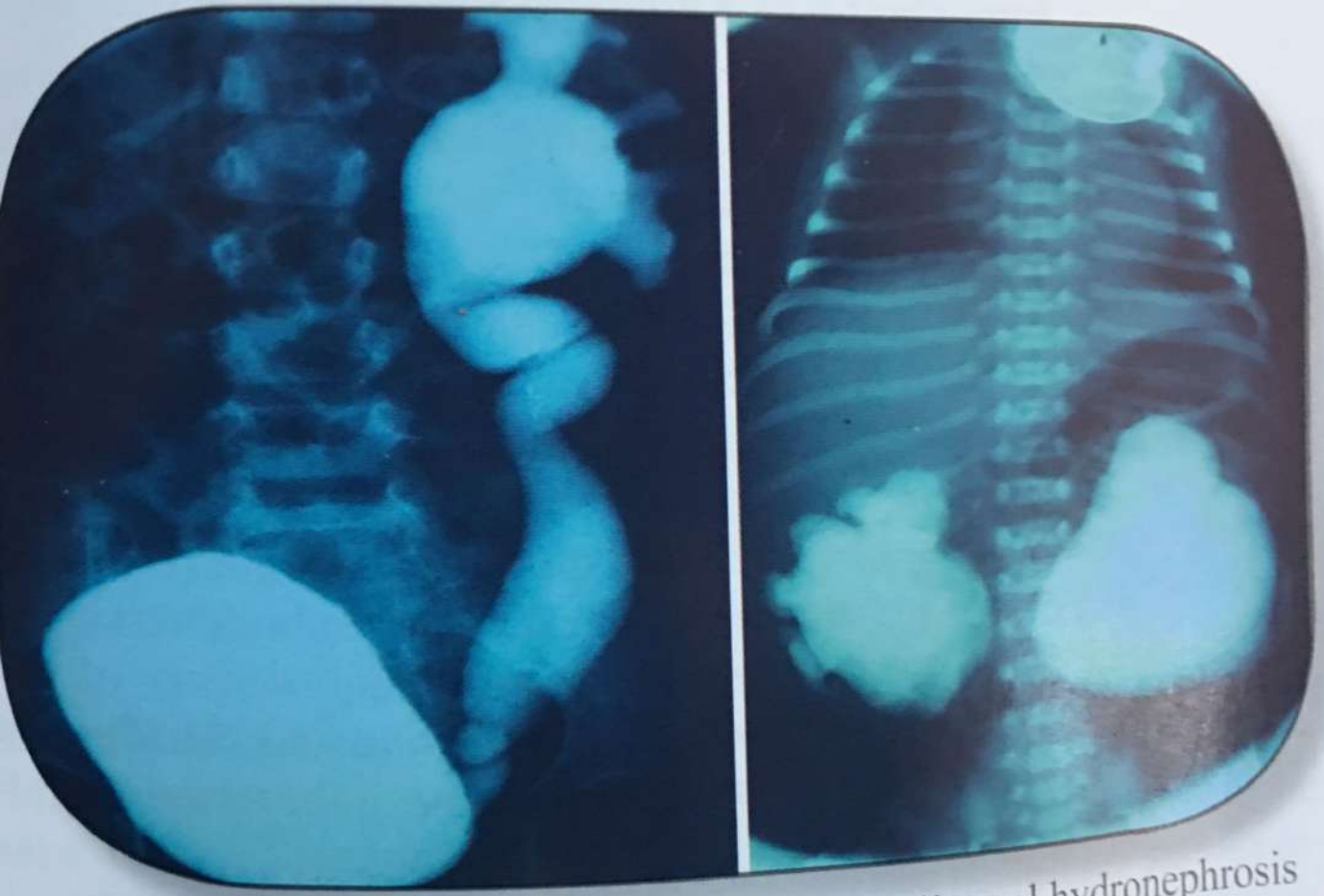
- Voiding cystourethrogram (VCUG)
- Renal ultrasound (RUS)
- Intravenous pyelogram (IVP)
- A renal (kidney) scan (MAG 3 ,DTPA , DMSA)



Urology Dept.Royal London Hospital (14)



Left Hydronephrosis



Left hdronephrosis

Bilateral hydronephrosis

Important Notes For The Resident

- The patients age one of the most important factors that help the potential etiology of an abdominal mass.
- The length of time since the mass was found.
- The rapidity of growth.
- The sign of gastrointestinal or genitourinary obstruction.
- The presence of constitutional symptoms such as pallor, anorexia, fever or weight loss.
- The solid masses and fluid- filled cysts are typically dull to percussion
- The presence of guarding or tenderness indicate of an inflammatory process.
- The plain abdominal x-ray, may help the location and density of the mass, presence of air-fluid level, absence of air in the rectum and calcification.
- The sonography can identify the organ of origin, type of the tissue (solid versus cystic).
- More specific anatomical information can be obtained by CT & MRI.

Head and neck lumps

Anterior Midline	❋ Thyroid
	❋ Thyroid associated lumps
	❋ Ectopic thyroid
	❋ Thyroglossal cyst
	❋ Plunging ranula
	❋ Dermoid cyst
Anterior Triangle	❋ Branchial cyst / Sinus.
	❋ Carotid aneurysm
Posterior Triangle	❋ Lymph nodes
Supra clavicular fossa	❋ Innominate or subclavian aneurysms
	❋ Lymph nodes (Virchov`s node)
Submandibular area	❋ Submandibular salivary gland
Parotid area	❋ Parotid gland
Others	❋ Cystic hygroma
	❋ Extra angular dermoid
	❋ Buccal cysts and sublingual ranula

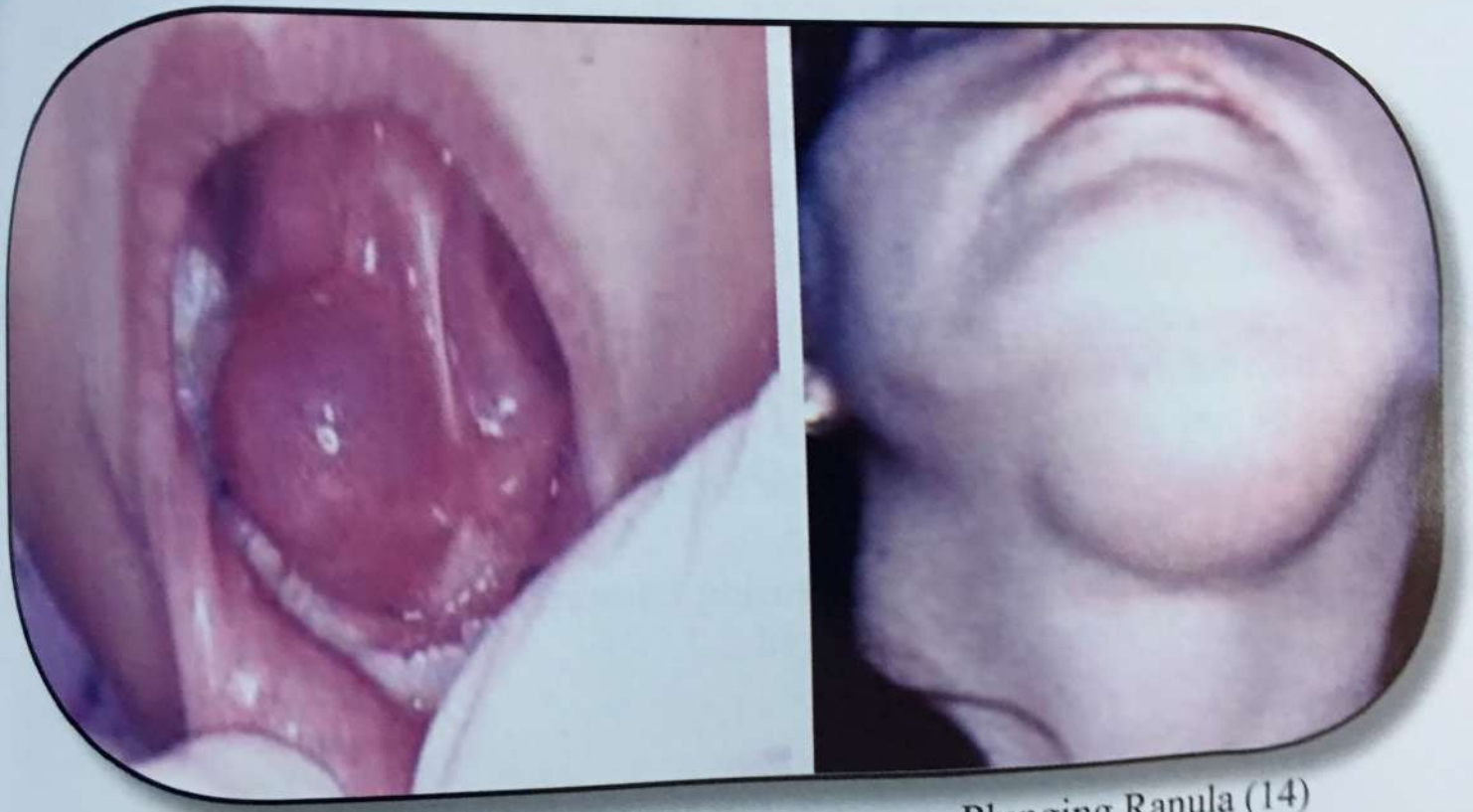
Examination of a lump

Look (7XS)
- Site, Position
- Size, in two direction
- Shape
- Surface, scar, sinuses,
- Surrounding, regional lymph nodes
- Skin, colour at rest and with pressure
- Shine a light, translucency

Feel (5XT)
- Tenderness
- Temperature
- Texture, smooth, rough, hard, soft, rubbery, spongy
- To press on it, Pulsatile, compressible, thrill.
- To feel its edge, discrete, ill defined, to get above/ below/ beside it.

Move (3XD)
- Does the lump move spontaneously with respiration.
- Does the skin move over the lump
- Does the lump move over the underlying structures.

Listen
- Bruit



Sublingual Ranula

Plunging Ranula (14)

Thyroid Swellings

Neonatal goiter (Cretinism)

- Generalized enlargement of the thyroid.
- Mother`s ingestion of preparations containing iodine, thiouracil, on treating the hyperthyroidism can block fetal thyroid hormone synthesis.
- The baby may be born with evidence of hypothyroidism and goiter.
- Can cause respiratory distress, and /or obstruction.
- Small dose of thyroxin may required.
- In a few cases with large goiters causing compression an emergency surgical split and / or tracheostomy is required.

Thyroglossal Duct Cyst

- A thyroglossal duct cyst is a fluid-filled sac located at the midline of the neck.
- These cysts most commonly occur in children before the age of 5.
- A small, round mass in the front of the neck is the classic presentation.
- These cysts are usually filled with mucous.
- Occasionally, they appear after an upper respiratory tract infection when they become enlarged and painful.
- If infected, redness and sometimes drainage of mucous from the cyst may occur through the skin.

causes a thyroglossal duct cyst

- A thyroglossal duct cyst is a congenital defect, which means that it was present from birth.
- When the thyroid gland forms during fetal development, it begins at the base of the tongue and moves down the neck through a canal called the thyroglossal duct.
- As the thyroid gland and thyroglossal duct develop, they travel around the hyoid bone.
- After the thyroid gland reaches its final location in the neck, the thyroglossal duct usually disappears.
- Occasionally, if portions of the thyroglossal duct remain along any point of the migration, a cyst may form.

Thyroglossal duct cysts

- Are remnants of the embryonic thyroglossal duct that may occur anywhere from the base of the tongue to the thyroid gland.
- The majority, are found at the level of the thyrohyoid membrane, under the deep cervical fascia.

Clinical features

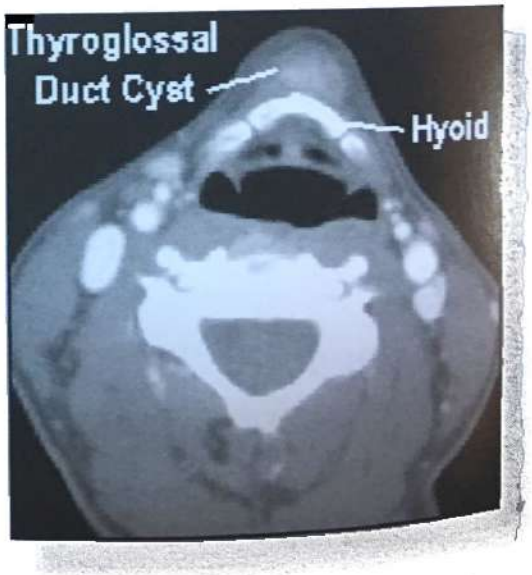
- Midline lesion arising anywhere along the path of the duct.
- Painless, fluctuant, movable mass.
- They are midline or just off the midline.
- Move up and down upon swallowing and on Protrusion of the tongue.
- Fistula will occasionally develop.

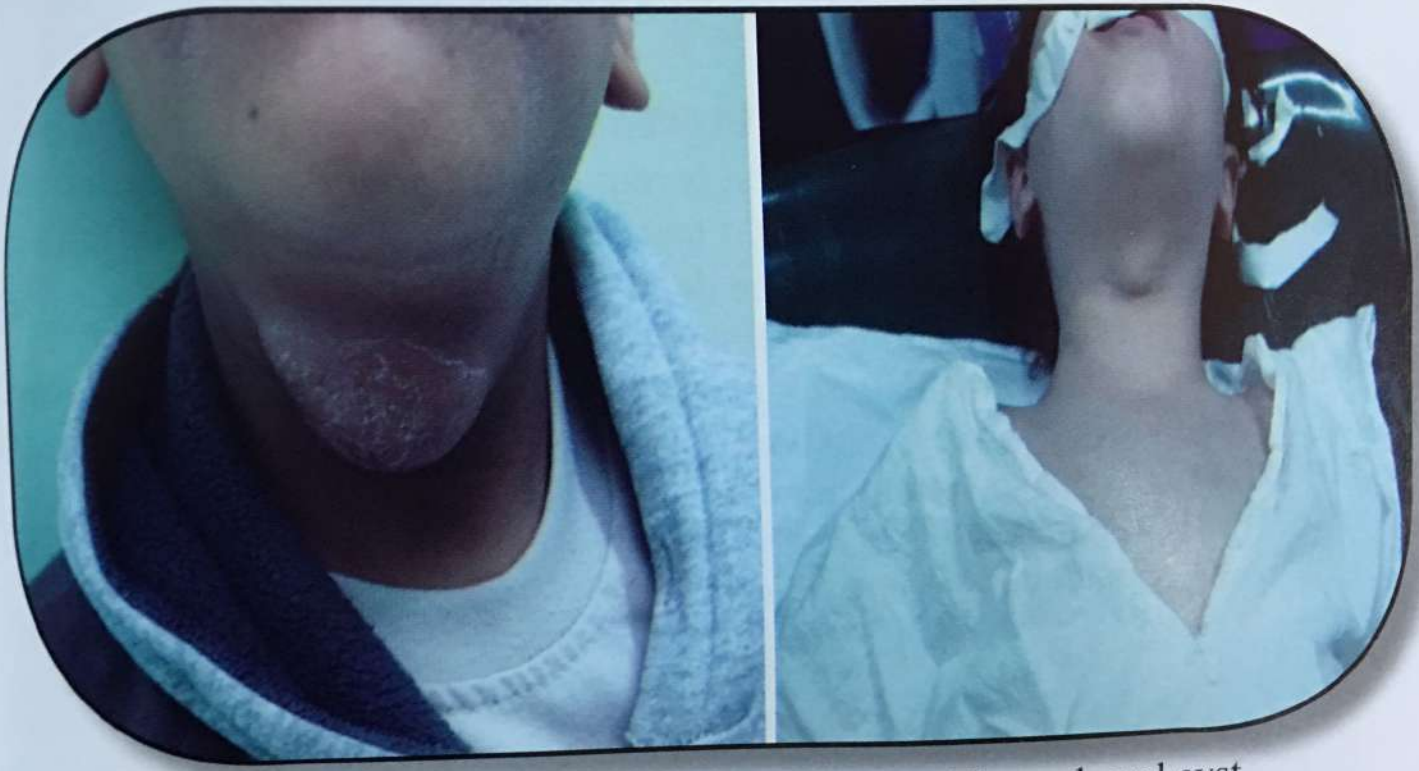
Differential diagnosis

- Thyroid neoplasm (Teratoma , MEN- 2).
- Dermoid cyst
- Submental lymph node
- Lipoma
- Ectopic thyroid
- Sebaceous cyst

How is the thyroglossal duct cyst diagnosed

Diagnosis Made by physical examination.
(Protrusion of the tongue causes it to move up& down)
Ultrasound Examination will help to confirm the presence of the cyst.
It is important to determine if the thyroid gland is located in its normal position.
CT Scan On occasion if necessary





Thyroglossal abscess

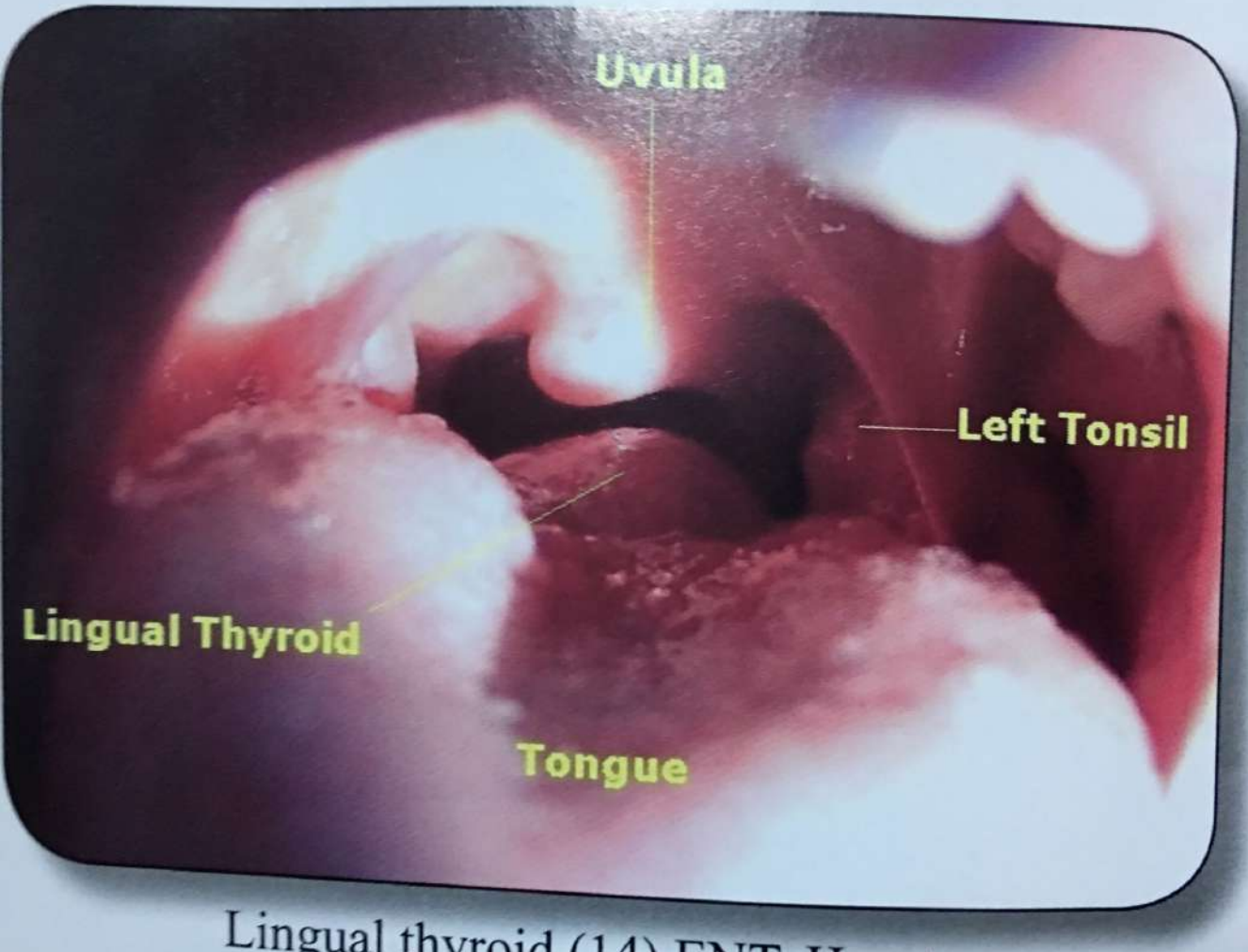
Thyroglossal cyst

How are the thyroglossal duct cyst managed

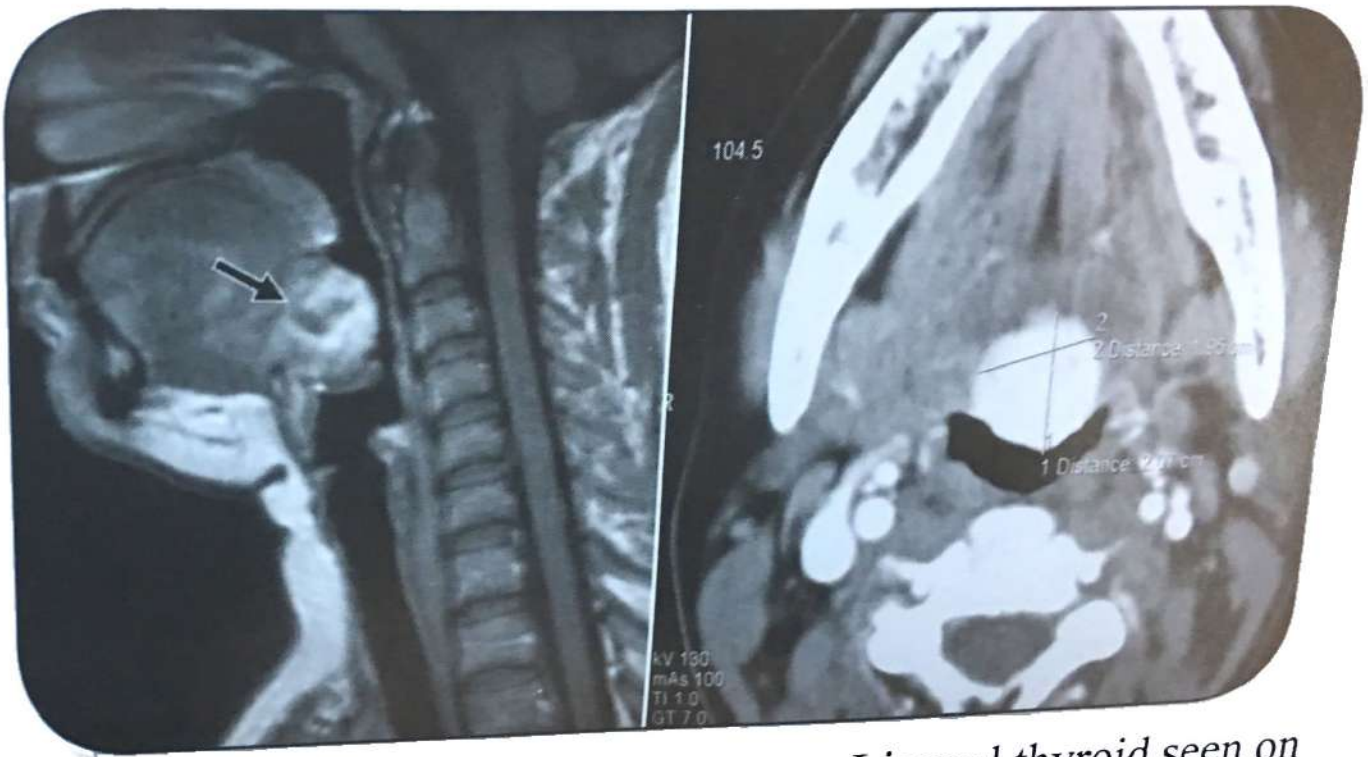
- If the cyst is infected, an antibiotic may be given to treat the infection.
- Surgical drainage of the infected cyst is required if the infection is severe with abscess formation.
- Following resolution of infection the definitive treatment is required
- Thyroglossal duct cyst is surgical removal.
- This surgery is called the **Sistrunk** procedure and includes removal of the cyst and the mid-portion of the hyoid bone, because of its intimate association with the thyroglossal duct, may contain remnants of the duct.
- If the hyoid bone is not surgically removed, there is a greater chance for recurrence of the thyroglossal cyst .

Lingual thyroid or ectopic thyroid

- The thyroid gland originates in the back of the tongue and migrates to the front of the neck.
- If it fail to migrate properly, it can remain high in the neck or even in the back of the tongue.
- The thyroid gland can also migrate too far into the mediastinum , called a substernal thyroid.
- Lingual thyroid are four times more common in female.
- They are asymptomatic, midline nodules in the posterior aspect of the tongue.
- They are usually less than a centimeter in size but can reach more than 4 cm.
- Large lesions can interfere with swallowing and breathing.



Lingual thyroid (14) ENT, Houston

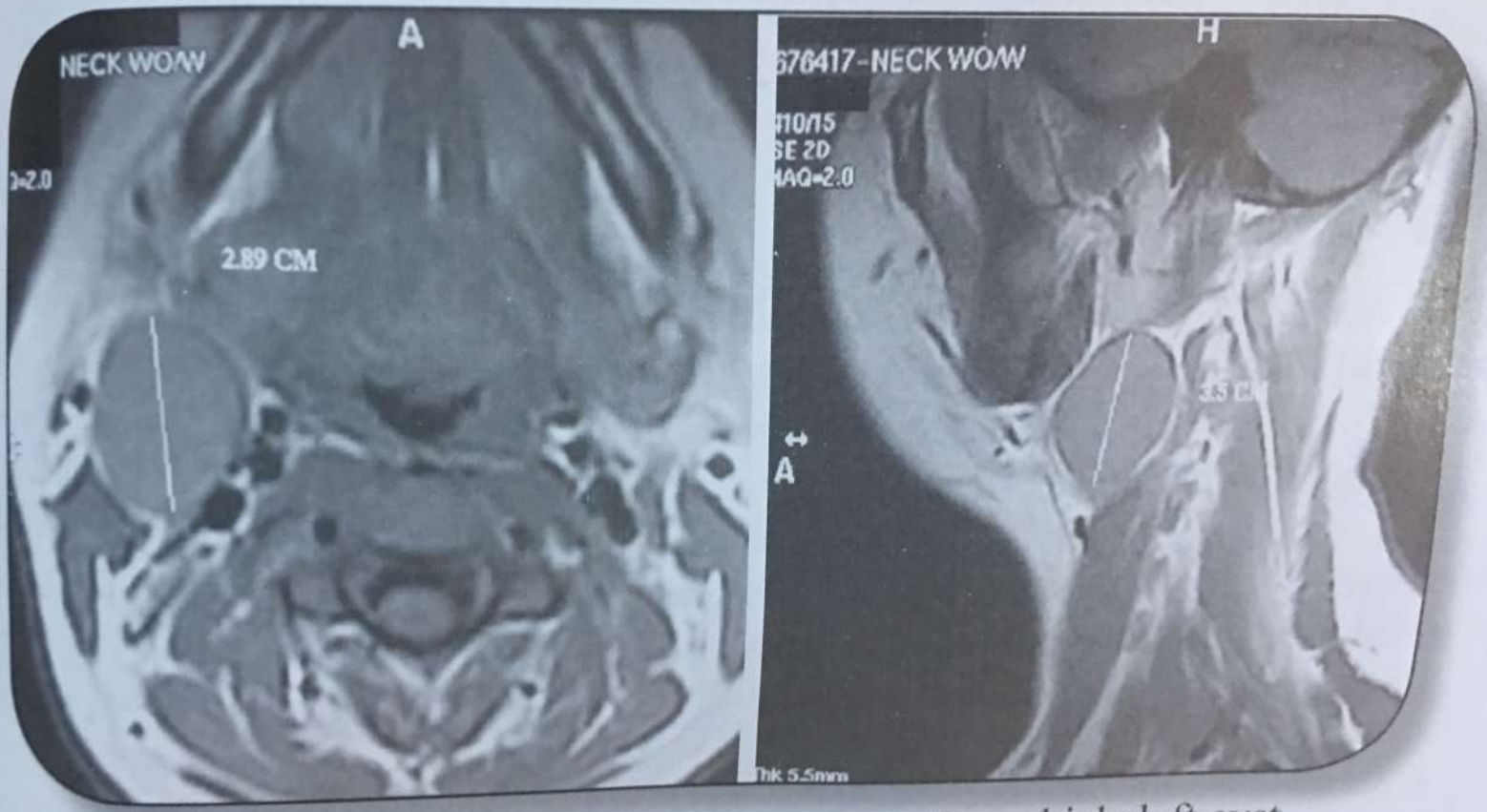


Sagittal reconstruction of CT scan of the neck, showing The lingual thyroid at the base Of the tongue.

Lingual thyroid seen on axial CT scan of the neck (14)

Branchial Cyst

- Presents as a solitary painless mass in the neck.
- A congenital lesion formed by incomplete involution of branchial cleft structures during embryonic development.
- Branchial cleft cysts are smooth, not tender and fluctuant.
- Tender mass if secondarily inflamed.
- They usually grow in the carotid triangle.
- Approximately 10% are bilateral.
- These cysts contain thick yellowish creamy fluid.
- They get infected and require drainage.
- The treatment of branchial cleft cysts is surgical.
- The recurrence rate is less than 7%.



Branchial cleft cyst
axial MRI projection

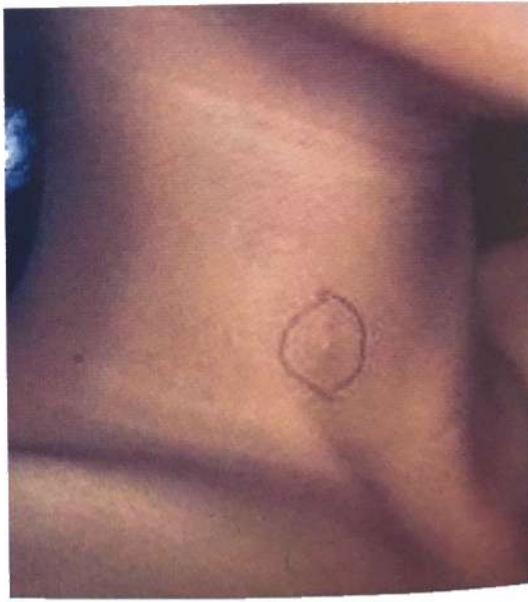
Branchial cleft cyst
sagittal MRI projection

Branchial Sinuses

- Arising from the second branchial cleft.
- More common than fistula.
- Mucoid or purulent discharge.
- opening at the skin over the anterior border of the sternomastoid.

Branchial Fistula

- One end open into the tonsillar fossa, and the other in the skin over the anterior border of the lower third of the sternomastoid muscle.
- The track usually passes between the internal and external carotid arteries.
- Should be surgicaly excised.



Lymphatic Malformation
Cystic Hygroma

Lymphangioma

- These are hamartomas of the lymph sacs.
- The hygroma is a multicystic, ill- defined,fluctuant mass of lymphatic cysts.
- The cysts are of all sizes contain crystal – clear fluid.
- Some contain cavernous haemangiomatous vessels.

Presentation & effect

depends on their site and size in the floor of the mouth or peripharyngeal area (endanger the airway, and cause dysphagia) sudden increase in size causing an emergency.

Treatment

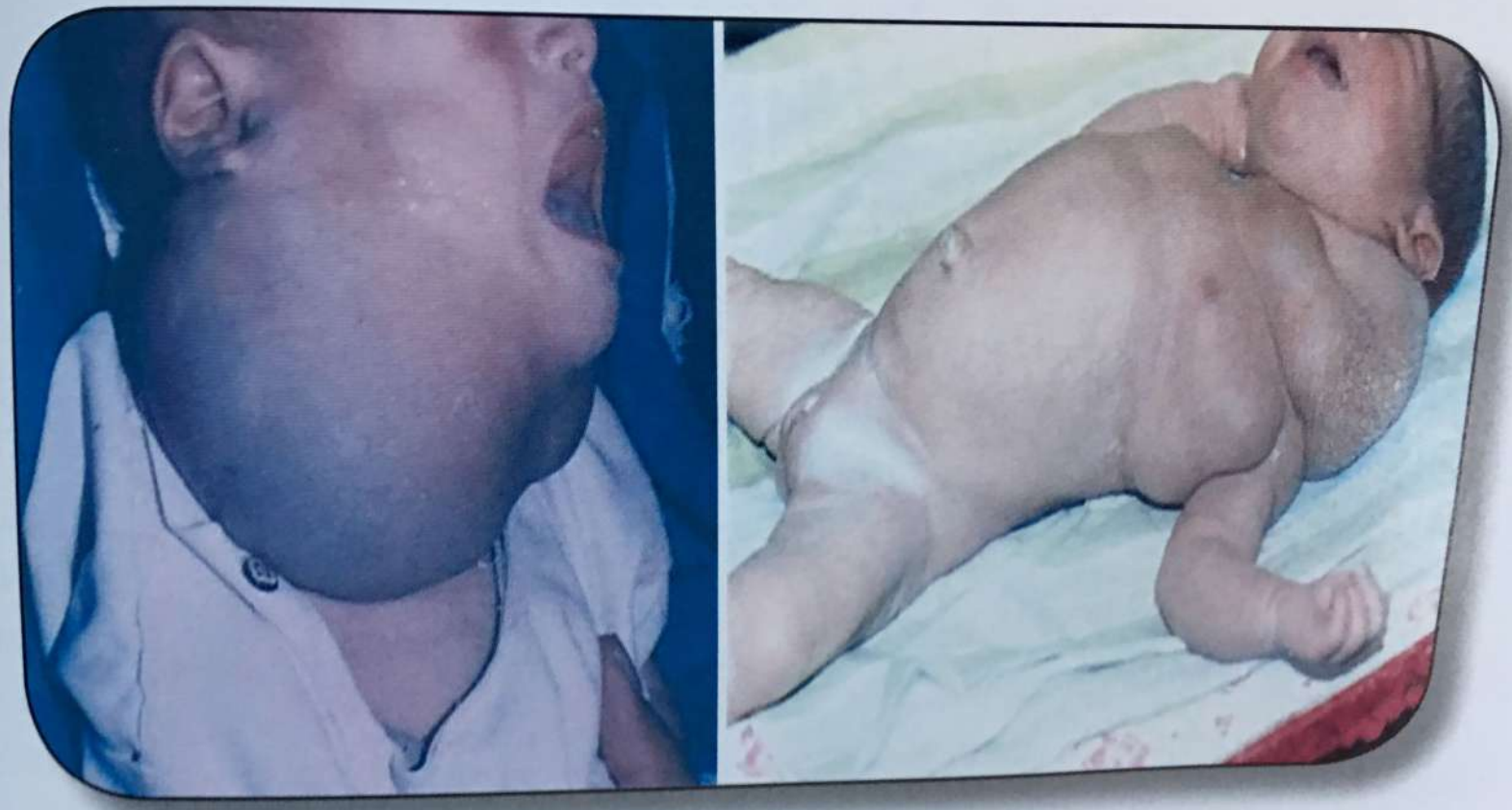
- Surgical excision
- Incomplete removal because the absence of the capsule.

Cystic hygroma (Lymphangioma)

- Lymphatic sacs that fail to communicate with the peripheral draining channels.
- The cyst may be unilocular or multilocular and of variable size.
- Combined as lymphatico- venous malformation.
- May increase in size suddenly due to infection or haemorrhage.
- Spontaneous shrinkage may occur.

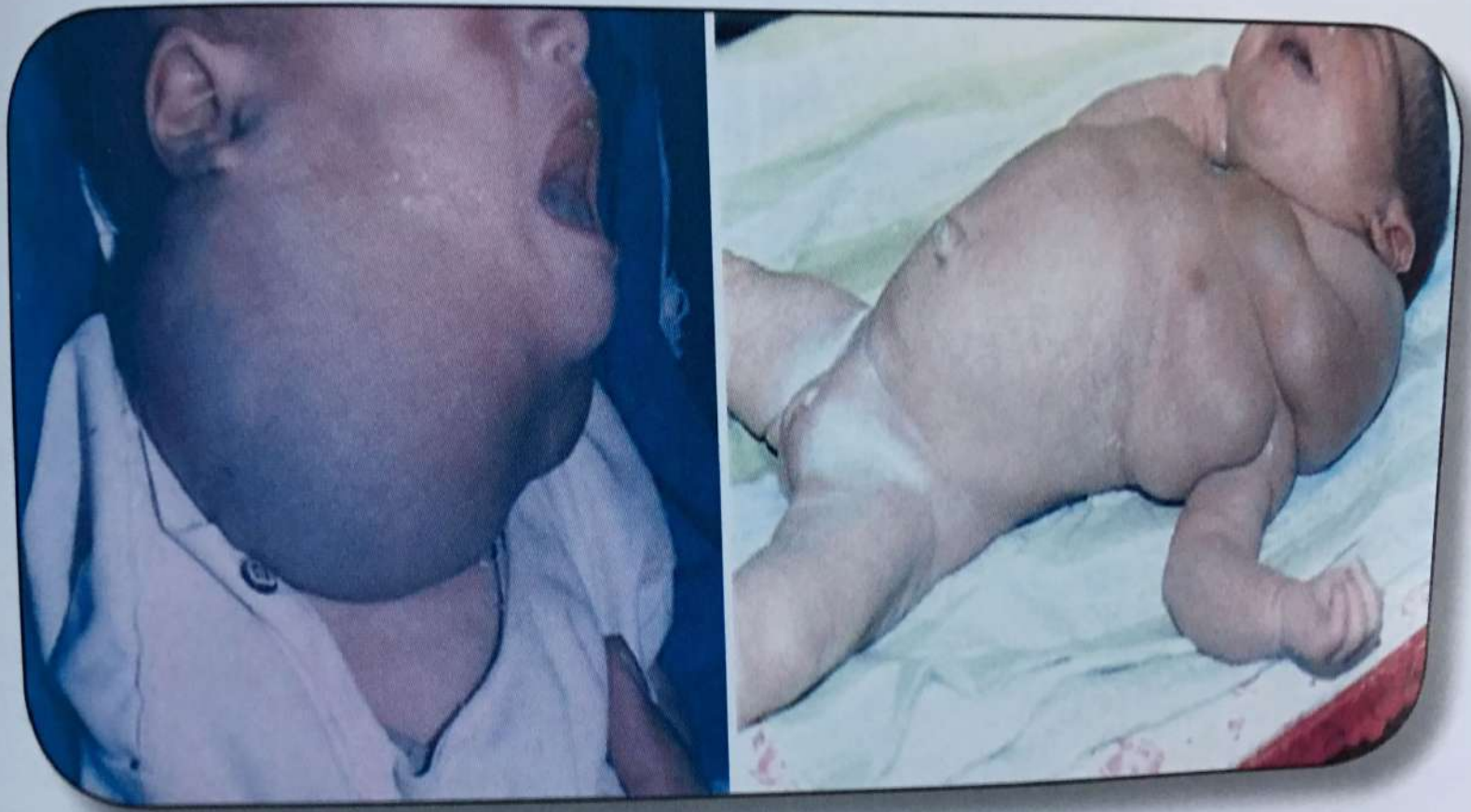
The site may occur

- In the neck 70%
- Axillary region 20%
- Superior mediastinum
- Mesentery
- Retroperitonium
- Pelvis and groin



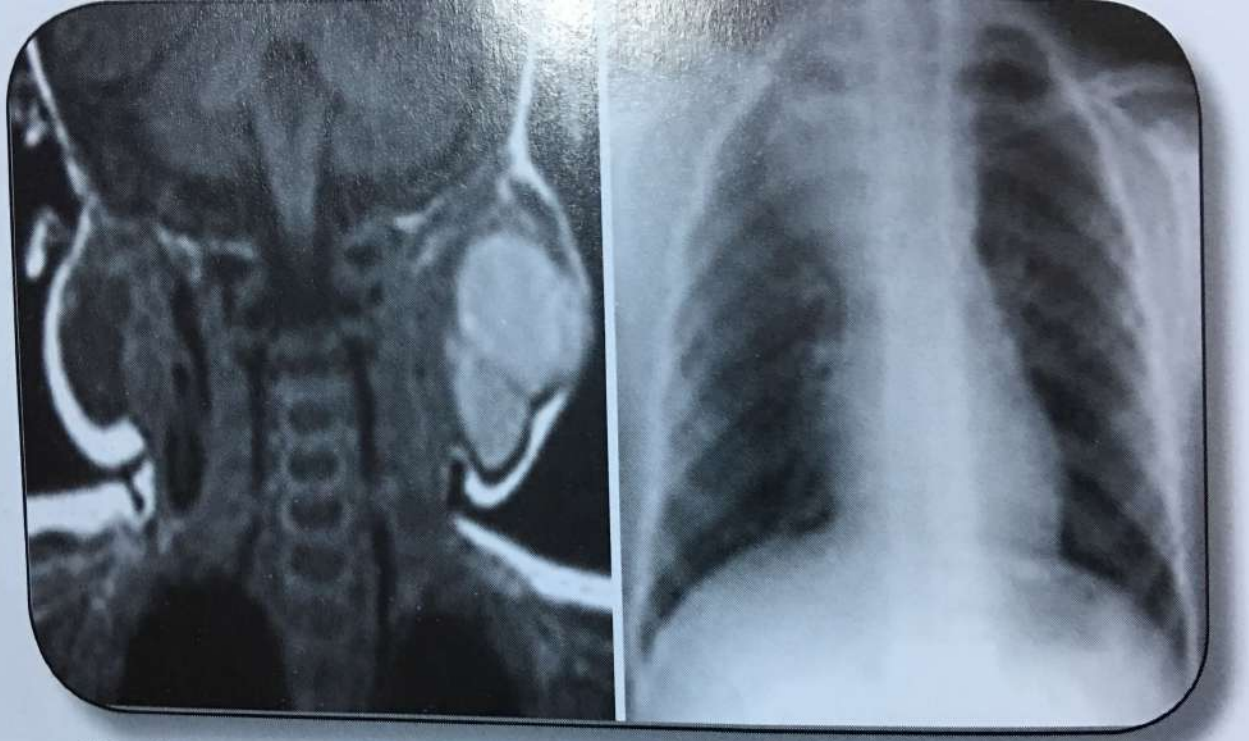
Cystic Hygroma

Lymphangioma



Cystic Hygroma

Lymphangioma



Neck CT Scan

Chest x-ray

Cystic Hygroma (Lymphangioma)

Important Notes For The Resident

- Most normal children have palpable cervical lymph nodes.
- The cervical lymph node is considered enlarged if it measures more than 10 mm at its longest diameter.
- Palpable supra- clavicular nodes are always considered abnormal.
- The resident should bring the specimen in saline to the pathologist immediately after removal.
- Formalin fixation made impossible to the number of studies for lymphoma, for evaluation including chromosome translocation studies and immunoperoxidase staining.
- The ectopic thyroid tissue identified within the thyroglossal duct remnant in about 25 – 35% of cases.
- Papillary adenocarcinoma has been describeed in up to 10% of patients undergoing thyroglossal duct excision in adulthood.
- Malignant degeneration has been reported in branchial cleft remnants persisting to adulthood.