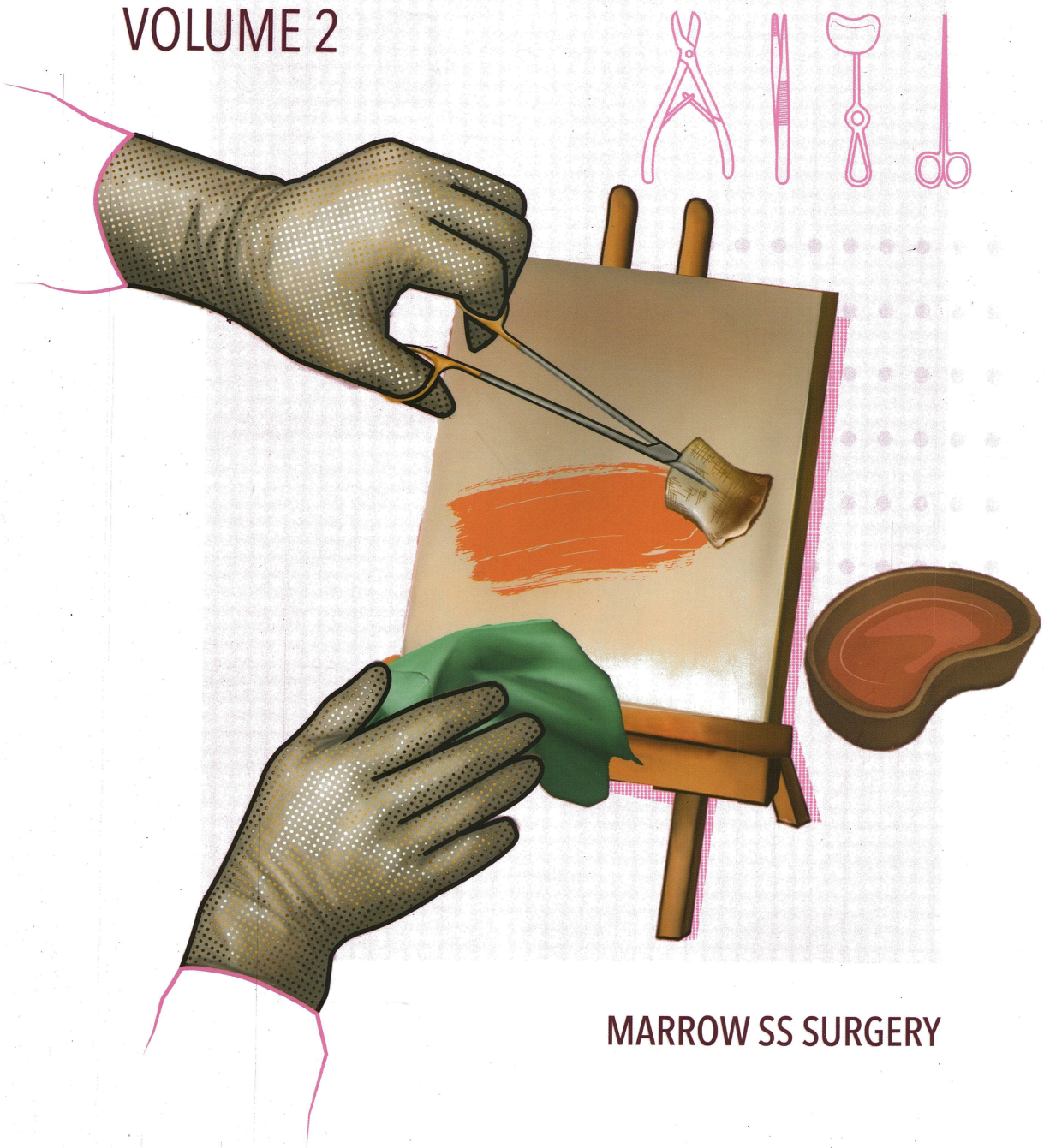
GENERAL SURGERY

VOLUME 2



MARROW SS SURGERY



Dr. Rohan Khandelwal

MS General Surgery, MRCS, FIBD, FICS

Dr. Rohan is an Onco-plastic Breast Surgeon trained at the University of Maryland (USA). He has successfully headed a Breast Cancer Unit for the last 10 years and is currently based at CK Birla Hospital, Gurgaon. In addition to his clinical practice, he has been actively involved in teaching for more than 14 years.

General Surgery

Volume - 2

MARROW
Super Speciality

Instructions

- The notes must be used in conjunction with the Marrow SS Surgery videos and should not be considered standalone material.

Please note:

- The information in this book has been printed based on the transcript of the Marrow SS Surgery videos.
- The information contained in this book is for educational purposes only. The content provided is not intended to substitute for professional medical advice, diagnosis or treatment.
- This book cannot be sold separately. It has been made available to only select eligible users who have an active subscription to Marrow SS Surgery videos.
- The text, images, slides, and other materials used in this book have been contributed by the faculty, who are subject matter experts. We have merely reproduced them as video transcripts in this book.
- The notes have been consciously designed in a way that is concise and revisable. To ensure this, we have intentionally added only the most relevant modules and images that are needed for you.
- Reasonable care has been taken to ensure the accuracy of the information provided in this book. Neither the faculty nor Marrow takes any responsibility for any liability or damages resulting from applying the information provided in this book.
- This set contains notes of all main videos published in the app until August 2025. You can find notes for any additional videos published after this date within the app under the videos section.

All Rights Reserved

No part of this publication shall be reproduced, copied, transmitted, adapted, modified or stored in any form or by any means, electronic, photocopying, recording or otherwise.

© Marrow

// ME821-PPL

Contents

Volume - 1

Foundation of General Surgery

1. Patient Safety, OT Zones and Surgery Positions 1
2. Surgical Blades and Energy Sources 7
3. Surgical Nutrition 13
4. Sutures, Knots and Surgical Drains 23
5. Causes of Post-Op Fever 31
6. Wounds and Surgical Site Infections 40
7. Shock I 46
8. Shock II 52
9. Common Surgical Swellings (Clinical Case Discussion) 57
10. Common Ulcers (Clinical Case Discussion) 66
11. Surgical Instruments 72
12. Day Care Surgery 84

Trauma

13. Basics of Trauma Management 89
14. Head Trauma 100
15. Thoracic Trauma 111
16. Abdominal Trauma 121
17. Thermal Injuries 133
18. Trauma : Emergency Scenarios 145

Breast

19. Breast I 149
20. Breast II 160

21. Breast III 170
22. Benign Breast Disease 179
23. Breast : Clinical Case Discussion and Operative Videos 188

Endocrine System

24. Thyroid I 192
25. Thyroid II 204
26. Thyroid III 215
27. Clinical Case of Neck Swelling 227
28. Parathyroid 230
29. Adrenal Gland & NET 237

Gastrointestinal and Abdominal Surgery

30. Esophagus I 246
31. Esophagus II 257
32. Esophagus III 263
33. Upper GI Hemorrhage 274
34. Stomach I 284
35. Stomach II 292
36. Stomach III 297
37. Intestinal Obstruction I 311
38. Intestinal Obstruction II 323
39. Small and Large Bowel : Benign Conditions 329
40. Appendix and Its Disorders 342
41. Colorectal Polyps and Cancer I 354
42. Colorectal Polyps and Cancer II 363
43. Rectum and Anal Canal I 370
44. Rectum and Anal Canal II 382

45. Liver I 387
46. Liver II 398
47. Gall Bladder and Biliary Tree I 409
48. Gall Bladder and Biliary Tree II 417
49. Benign Pancreatic Conditions 429
50. Malignant Pancreatic Conditions 443
51. Abdominal Lump (Clinical Case Discussion) 458
52. Spleen 464
53. Abdominal Emergencies 471

Volume - 2

Urology

54. Testicular Disorders I 483
55. Scrotal Swelling (Clinical Case Discussion) 493
56. Testicular Disorders II 494
57. Urethral and Penile Disorders 499
58. Kidney I 510
59. Kidney II 525
60. Bladder 541
61. Prostate Disorders I 547
62. Prostate Disorders II 555

Speciality Surgery

63. Bariatric Surgery 563
64. Principles of Minimally Invasive Surgery 570
65. Transplant Surgery 575
66. Plastic Surgery, Wounds and Cleft Lip I 585
67. Plastic Surgery, Wounds and Cleft Lip II 595

68. Neurosurgery I 600
69. Neurosurgery II 607

Hernia and Its Management

70. Hernia I 615
71. Hernia II 627
72. Inguinoscrotal Swelling (Clinical Case Discussion) 638

Vascular Surgery

73. Deep Vein Thrombosis 642
74. Varicose Veins 649
75. Arterial Disorders I 660
76. Arterial Disorders II 667
77. Lymphatic Disorders 680

Head and Neck Including Faciomaxillary Surgery

78. Oral Cancer 690
79. Salivary Glands 702
80. Oral Lesions (Clinical Case Discussion) 712

Special Topics in General Surgery

81. Skin Tumors and Soft Tissue Sarcomas 716
82. Thorax and Mediastinum 725

Recent Updates Bailey 28th Edition

83. First 5 Chapters 737
84. Nutrition 743
85. Head and Neck 747
86. Endocrine Surgery 756

87. GIT Part I 765
88. GIT Part II 776
89. GIT Part III 786
90. Trauma Surgery 792
91. Vascular Surgery 796
92. Transplant Surgery 800
93. Urology 808

Biostatistics

94. Introduction to Data in Biostats 813
95. Measures of Central Tendency and Variation 815
96. Normal Distribution Curve 818
97. Concept of Probability Value 821
98. Tests of Significance 824
99. Correlation, Regression and Skew 825
100. Sampling Methods and Calculation 829
101. Probability and Tiles 833
102. Graphs 836
103. Biostats Review and QA Round 849

Epidemiology

104. Analytical Epidemiology 857
105. Advanced Analytical Study Designs 859
106. Experimental Epidemiology 862
107. Evidence Based Medicine 868

Screening

108. Advanced Concepts in Screening of Disease 872

TESTICULAR DISORDERS I

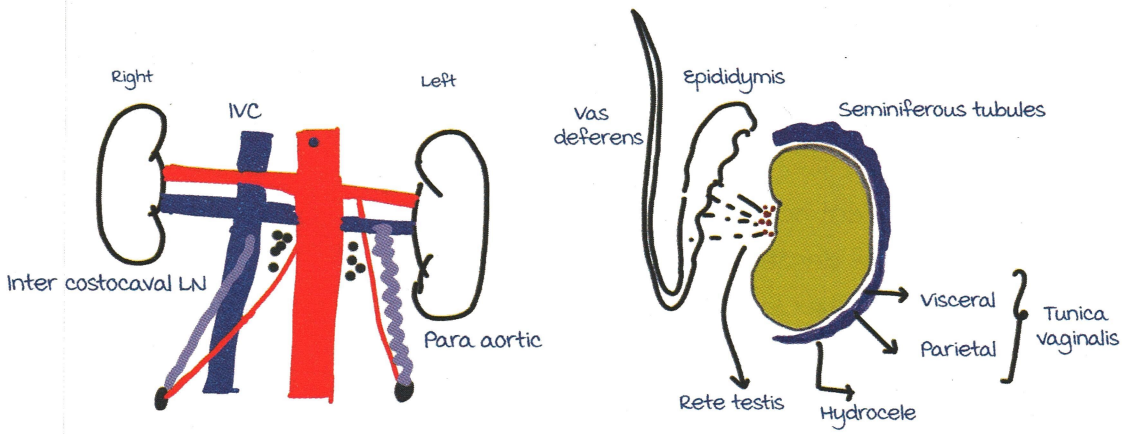
----- Active space -----

Anatomy of testis

00:01:02

Overview :

- Seminiferous tubules : Site of spermatogensis.
- Rete testis : Communication of epididymis and sperm transfer happens here.
- Epididymis transports sperms into vas deferens.
- Tunica albuginea : Covering around testis.
  - Visceral layer of tunica vaginalis.
  - Parietal layer of tunica vaginalis.



Blood supply and anatomy of testis

Blood supply :

- Testicular artery is branch of abdominal aorta.
- Right testicular vein directly drains into IVC.
- Left testicular vein drains into left renal vein.

Lymphatic drainage :

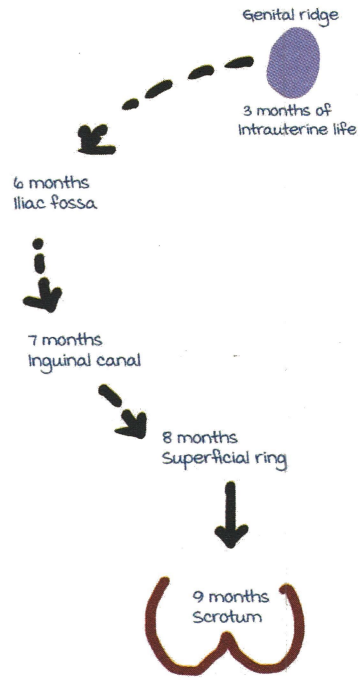
- Pre/para/inter aorto caval lymph nodes.
- Right side :
  - 1st level : Between IVC & aorta & inter-aorto caval lymph nodes.
- Left side :
  - 1st level : Para aortic lymph nodes.

----- Active space -----

Undescended testis

00:06:15

Overview :

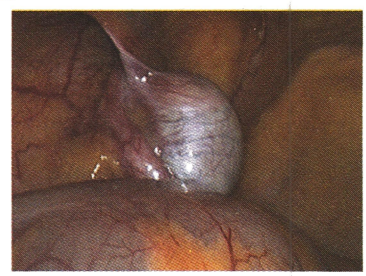


Descend of testis

- Develops in retroperitoneum from genital ridge.
- At 3 months of intra uterine life, starts to descend.
- Factors involved in descent :
  - Pull of gubernaculum.
  - Differential growth of abdominal wall (major factor).
  - Hormonal factors.
- By 6 months of intra uterine life, it lies in iliac fossa.
- In 7th month, it lies in inguinal canal.
- By 8th month of intrauterine life : At superficial inguinal ring.
- 9th month : Descends into scrotum.
- Undescended testis is more common on right side because descent occurs later on the right side.
- Normal path of descent of testis gets arrested.
- Most common site : Inguinal canal.
- If bilateral, it is termed as cryptorchidism.
- Spontaneous descent can occur till 4-5 months of age.
- In pre term/pre mature baby, risk of undescended testis is higher.

Changes in undescended testis :

- Reduced volume.
- Increased risk of intratubular germ cell neoplasms (ITGCN).
- Higher risks of seminoma.
- Sertoli cells are affected more than leydig cells.
  - Sertoli cells affected more : Spermatogenesis are affected.
  - Leydig cells affected less : Normal secondary sexual characters.
- Higher the testis : More histological changes.


Undescended testis

Clinical features :

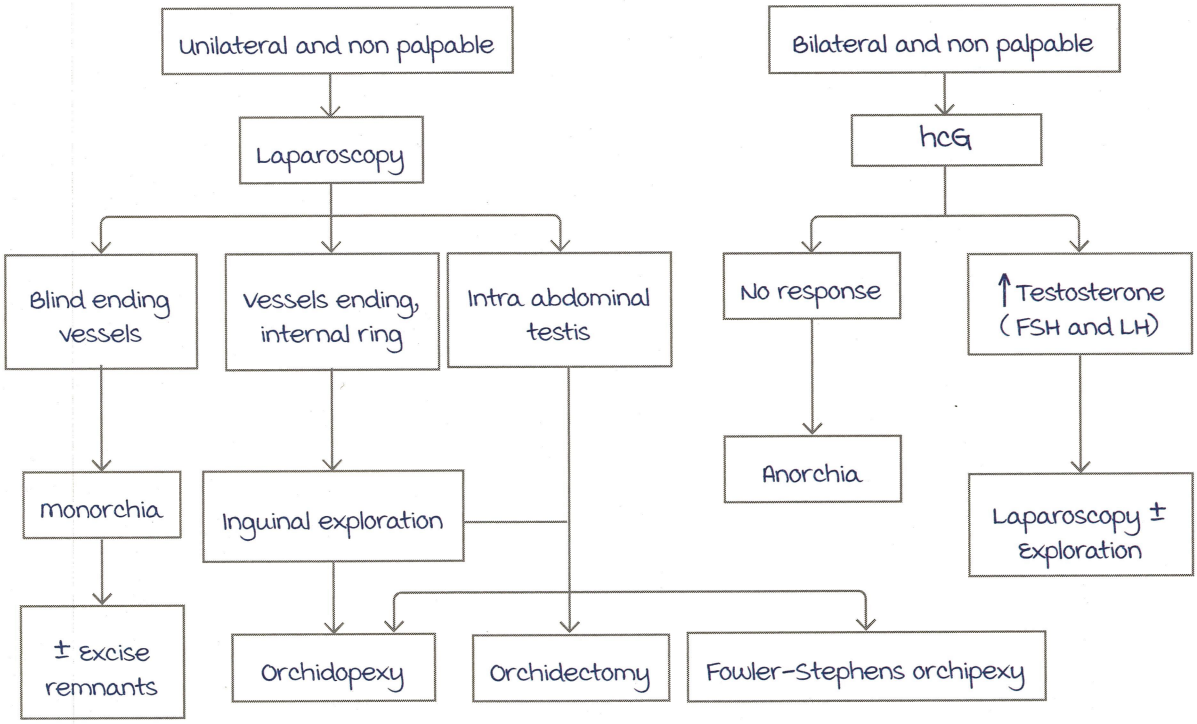
- Missing testis from scrotum (U/L or B/L).
- If testis in inguinal region : Palpable swelling in inguinal canal.
- If intra abdominal : Non palpable.

Diagnosis :

----- Active space -----

IOC for intra abdominal testis : Diagnostic laparoscopy.

Management :



Orchidopexy :

3 types :

- Stephen-Fowler technique : 2 stage procedure.
  - 1st stage : High ligation of testicular vessels and position testis in inguinal canal. Length of testicular vessels is the limiting factor for orchidopexy.
  - 2nd stage : Place testis into scrotum.
- Keetley Torek procedure.
- Silbar's technique : Best results.
  - Testicular vessels cut.
  - Testis placed in scrotum.
  - Microvascular anastomosis of testicular vessels with internal iliac vessels.

Complications of undescended testis :

- Torsion.
- Epididymo-orchitis.
- Sterility (In bilateral).
- Trauma.

----- Active space -----

- Indirect inguinal hernia (m/c complication due to pull of processus vaginalis).
- Seminoma or cancer (6–9 times risk).

Note :

- Ectopic testis :
  - Testis deviates from normal path of descent.
  - m/c site : Superficial inguinal pouch.
  - Management : Orchidopexy.
- Retractile testis :
  - Normal variant.
  - Testis present in scrotum but occasionally jumps into inguinal canal.
  - O/E : Scrotal rugosities +.
  - In undescended testis, scrotal rugosities absent due to undevelopment of testis.
  - Management : Reassurance.

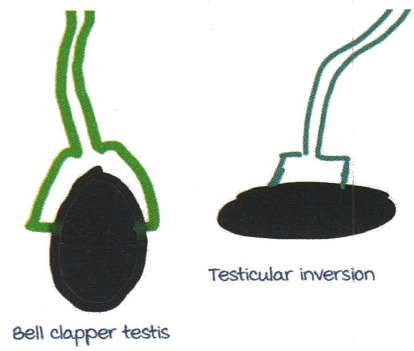
Testicular torsion

00:28:48

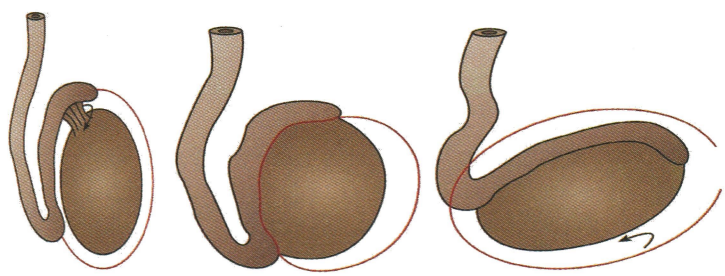
Overview :

Pre disposing factors :

- Bell clapper testis : High investment of tunica vaginalis.
- m/c pre disposing factor of torsion of testis :
  - Testicular inversion.
  - Undescended testis.
  - Torsion of cyst of morgagni.
- On Doppler : Blue dot sign.



Predisposing factors of testicular torsion



Testicular torsion | Normal attachment | Abnormally high attachment of tunica vaginalis predisposes to torsion : The bell clapper

Clinical features :

- C/F are similar to testicular torsion.
- Young male.
- H/O urinary tract infection.
- Acute scrotal pain and swelling (D/D : Epididymo orchitis).

Signs to differentiate torsion and epididymo orchitis :

- Prehn's sign : Lifting the involved testis.
  - If pain increases : Torsion testis.
  - If pain decreases : Epididymo-orchitis.
- Deming sign :
  - In case of torsion, affected side lies at a higher level.
- Angel sign :
  - Transversely placed testis in torsion.
- It is mainly clinical diagnosis & supported by doppler studies.

Management :

Scrotal exploration :

- If testis viable :
  - Incomplete torsion.
  - Intervened with 6-8 hours.
  - De-rotate testis and orchidopexy is done.
  - 3 point fixation.
- If testis not viable :
  - 720° twist (Double twist).
  - Late intervention.
  - Orchidectomy is done.

Note :

- Always perform a prophylactic orchidopexy on the C/L side.

Epididymo-orchitis

00:38:52

Overview :

- Inflammation and infection of epididymis and testis.
- Presentation : Acute scrotal pain and swelling.
- m/c organism <40 years : Chlamydia.
- m/c organism >40 years : E-coli (2° to UTI).
- D/D : Torsion of testis.

----- Active space -----

Management :

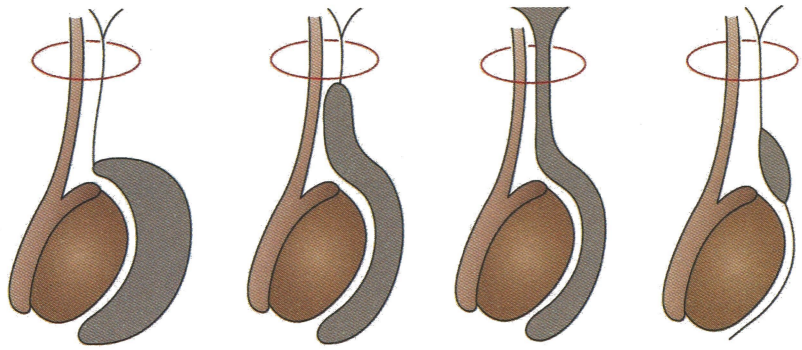
- Antibiotics.
- Pain killers.
- Scrotal support.

Hydrocele

00:39:58

Overview :

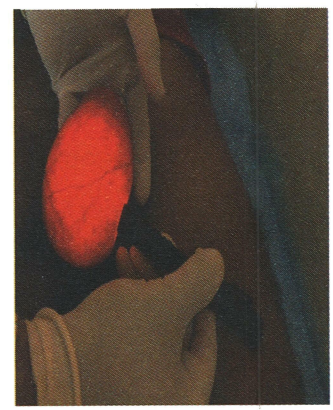
- Fluid accumulation in tunica vaginalis.
- m/c type of hydrocele : vaginal hydrocele.



Vaginal hydrocele | Infantile hydrocele | Congenital hydrocele | Hydrocele of the cord

Vaginal hydrocele :

- Accumulation of fluid only around the testis.
- Scrotal swelling and can get above the swelling.
- 2 types : Primary and secondary.



Transillumination

Primary vaginal hydrocele (m/c) :

- Due to defective absorption of fluid.
- Clinical features :
  - Tense swelling.
  - Testis is not palpable.
  - Clear fluid : Brilliantly transilluminant.

Secondary vaginal hydrocele :

- Due to increased secretion of fluid or secondary to :
  - Torsion.
  - Trauma.
  - Tumor.
  - Epididymo-orchitis (m/c cause of secondary vaginal hydrocele).

- C/F of secondary vaginal hydrocele :
  - Lax swelling.
  - Testis is palpable separately.
  - Turbid fluid : No transillumination.

Note : Fluctuation sign is positive in hydrocele.

Management :

Surgery :

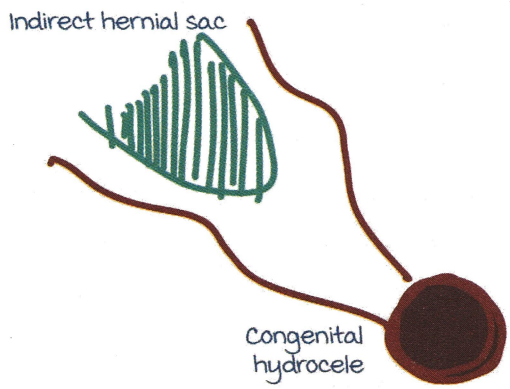
- Jaboulay's procedure (m/c procedure done) :
  - Eversion of sac. Done for large hydrocele.
  - Steps :
    1. Scrotal incision made.
    2. Separate the sac from surroundings.
    3. Rupture the sac to drain fluid.
    4. Evert the sac and suture with the scrotal wall, after safely dissecting testis and cord.
- Lord's plication : Done for small hydrocele.
  - Crumbling the secreting surface.

Infantile hydrocele :

- Tunica vaginalis extended upto deep ring.
- Cannot get above the swelling.
- Management : Excision of excess sac + eversion of sac.

Congenital hydrocele :

- Patent processus vaginalis.
- Communicates with peritoneal cavity.
- Indirect inguinal hernial sac may be present.
- Management : Herniotomy by 2-3 years of age.



Congenital hydrocele

Encysted hydrocele of the cord :

- Small swelling present along the cord.
- Mx : Excise the swelling without damaging cord.

----- Active space -----

----- Active space -----

Note :

Spermatocele	Epididymal cyst
Unilocular	Multi-loculated (Bunch of grapes)
Involves epididymal head : Sperm transport mechanism	Cystic degeneration of epididymis.
Barley coloured fluid (No transillumination)	Crystal clear fluid (Transillumination) : Chinese lantern pattern.
Sperms present	
Mx : If symptomatic : Excision	Mx : If symptomatic : Excision. Hamper with sperm transport and can affect fertility.

Varicocele

00:55:29

Overview :

- Dilated tortuous pampiniform plexus of veins.
- Common cause of male infertility.
- M/C on left side > right side.

Factors responsible for left sided varicocele more than right sided varicocele :

- Left testicular vein is longer.
- Left testicular vein drains at right angle to left renal vein.
- Sigmoid colon can press on left testicular vein can further hamper drainage.
- Left adrenal vein opens opposite left testicular vein.

Note :

- RCC can spread along renal vein : Can block opening of testicular vein and can give rise to secondary varicocele.
- Recent onset left sided varicocele can be a feature of left RCC.

Clinical features :

- Asymptomatic.
- Infertility.
- Sperm counts are low due to counter current mechanism maintaining 2°C temperature difference in the abdomen is been lost.
- Dull pain in scrotum.
- Scrotal swelling.
- O/E : Bag of worms appearance (Typical).

----- Active space -----

Investigations :

- IOC : Colour doppler or duplex scan.

Grading of varicocele :

- I : Inpalpable but detected on doppler.
- II : Palpable, detected on doppler.
- III : Visible.

Management :

- Asymptomatic : No treatment.
- If symptomatic : Embolization of veins and surgery.

Surgery :

- Inguinal varicocelectomy : Ivanisevich procedure.
- Retroperitoneal route : Palomo's procedure.
- Natural orifice transluminal endoscopic surgery (via bladder).

Note :

- High recurrence rates : Due to dual blood supply of testis.
- Only 30-40% patients, improvement of sperm counts is noted.

Fournier's gangrene

01:05:06

Overview :

- Necrotising fascitis involving the perineal region.
- If it extends to abdominal wall : Meleney's gangrene.
- Synergistic infection : Aerobic + anaerobic bacteria.
- Polymicrobial in nature.
- Immunocompromised : DM, elderly.
- Starts as trivial trauma.



Fournier's gangrene

C/F :

- Pain.
- Fever.
- Swelling.
- Foul smell odour.
- Shock : High mortality rate.

----- Active space -----

Management :

- IV fluids.
- IV antibiotics : Aerobic + anaerobic coverage.
- Analgesics.
- Shock management.
- Aggressive debridement.
- Foley's catheter can be done.
- No need for supra pubic catheterization.
- Testis and urethra are usually spared in these patients due to dual blood supply even in severe cases.
- High mortality rates.

----- Active space -----

SCROTAL SWELLING (CLINICAL CASE DISCUSSION)

History

00:00:13

A 36-year old male (Resident of Bihar) presented with a swelling involving the right inguino-scrotal region since 6 months, gradually progressive in size, associated with dull, dragging pain.
No history of trauma (Rules out hematocele).
No episodes of sudden pain/vomiting (R/o obstruction).
General physical examination : Average built, vitals stable.
Adequate hydration & nutrition, NAD.

Local examination (Inferences)

00:02:22

Inspection :

- Right sided hemiscrotum with loss of scrotal rugosity.
- Penis is deviated to left side.
- No bulge over inguinal region & Cough impulse absent (Rules out hernia).

Palpation :

- No local rise of temperature and non tender.
- Cord is felt & swelling is below the fingers i.e., can get above the swelling, confirms its is a scrotal swelling (Rules out inguino-scrotal swelling).
- Fluid filled swelling with fluctuation present and testis not palpable separately (Confirms hydrocele).
- Trans-illumination sign : Positive.

Diagnosis, investigations and treatment

00:08:31

Diagnosis : Right sided primary vaginal hydrocele (m/c, clear fluid, tense, testis not palpable separately).
Investigations :

- To support diagnosis : USG.
- To manage patient : Viral markers, clotting profile, etc.

Treatment : Jaboulay's procedure (Eversion of sac).

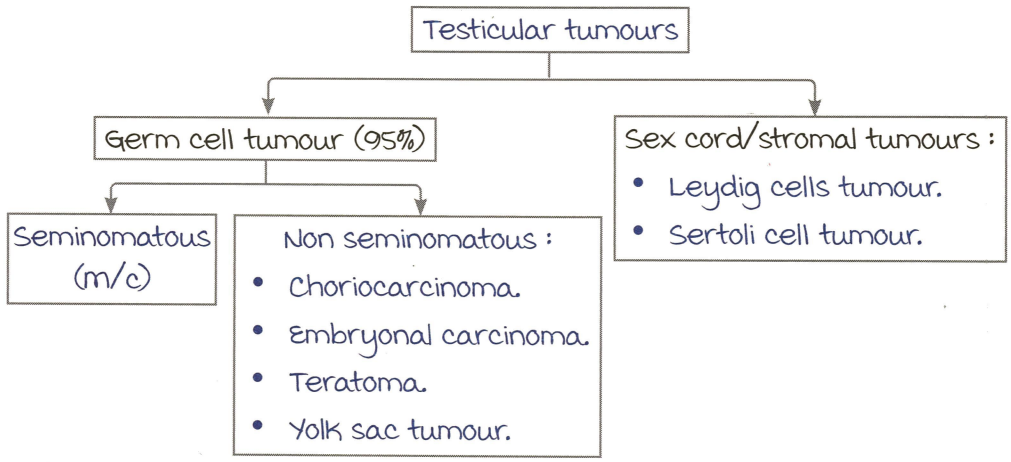
----- Active space -----

TESTICULAR DISORDERS II

Testicular tumors

00:00:08

Types :



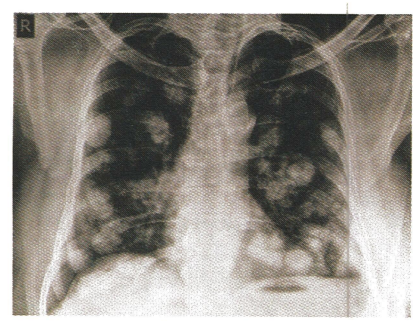
Note :

- m/c tumour overall : Seminomatous germ cell tumours.
- m/c tumour in children : Yolk sac tumours.
- m/c tumour in elderly : Lymphomas.
- m/c bilateral testicular tumour : Lymphomas.

Clinical features :

Clinical presentation :

- Painless testicular mass : m/c presentation.
- Abdominal lumps : Retro-peritoneal lymph nodes (70%).
- Cannon ball metastasis to lungs.



Cannon ball metastasis

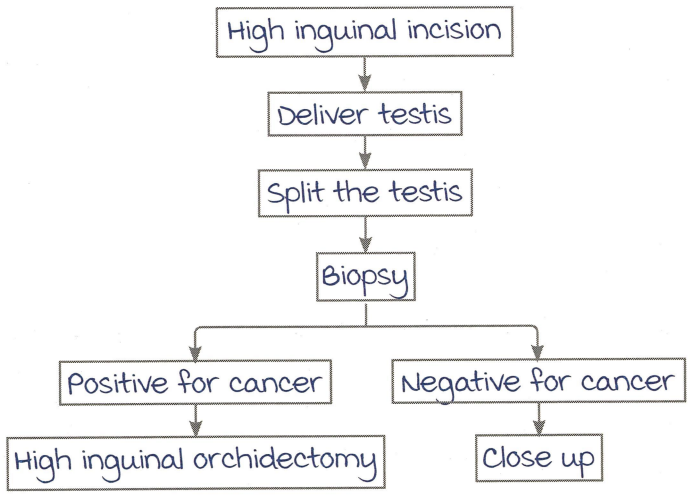
Atypical presentations :

- Hurricane tumour : Very aggressive choriocarcinoma.
  - Median survival period : 6 months.
  - It grows so quickly that it outgrows its blood supply.
  - Spread to other organs before the outgrowth.
- Sertoli cell tumours : Presents with features of feminisation.
- Leydig cell tumours : Presents with features of masculinization, gynaecomastia or precocious puberty.

----- Active space -----

Work-up of the patient :

- No transscrotal biopsy/FNAC is done due to risk of upstaging of tumour.
- Suspected case of testicular tumour → Chevassu manoeuvre.



Diagnosis :

Tumour markers :

- Beta hcG.
- LDH.
- Alpha-feto-protein.

Staging of testicular tumors

00:08:59

Pathological staging :

PT-Primary Tumour	
PTX	Primary tumour cannot be assessed
PTO	No evidence of primary tumour (e.g. histological scar in testis)
PTIS	Intratubular germ cell neoplasia (carcinoma in situ)
pT1	Tumour limited to testis and epididymis withoutvascular/lymphatic invasion; tumour may invade tunica albuginea but not tunica vaginalis
pT2	Tumour limited to testis and epididymis with vascular/lymphatic invasion, or tumour extending through tunica albuginea with involvement of tunica vaginalis
PT3	Tumour invades spermatic cord with or without vascular/lymphatic invasion
pT4	Tumour invades scrotum with or without vascular/ lymphatic invasion
N-Regional Lymph Nodes - Clinical	
NX	Regional lymph nodes cannot be assessed
NO	No regional lymph node metastasis
N1	Metastasis with a lymph node mass 2 cm or less in greatest dimension and 5 or fewer positive nodes, none more than 2 cm in greatest dimension
N2	Metastasis with a lymph node mass more than 2 cm but not more than 5 cm in greatest dimension; or more than 5 nodes positive, none more than 5 cm; or evidence of extranodal extension of tumour

----- Active space -----

M category :

- M0 : No metastasis.
- M 1 :
  - M 1A : Lung/non regional lymph nodes.
  - M 1B : metastasis to other areas.

Staging based on tumour markers :

- Post orchidectomy values : 7 to 10 days after surgery.
  - Half life of AFP : 5 to 7 days.
  - Half life of hCG : 1 to 3 days.

S stage	LDH (U/l)	hCG (mIU/mL)	AFP (ng/mL)
Sx	Not available	Not available	Not available
SO	Normal	Normal	Normal
S1	S1 <1.5 x normal	<5,000	<1,000
S 2	1.5 - 10 x normal	5000 - 50000	1000 - 10000
S 3	> 10 x normal	> 50000	> 10000

- AFP is never raised in pure seminomatous tumour.
- Inhibin is raised in leydig cell/sertoli cell tumour.
- Placental ALP is raised in seminomas.

AJCC updates in staging :

Category	Details
Tis	New category germ cell neoplasia in situ adopted
pT1a and pT1b	Pure seminoma sub-categorized using 3 cm tumour size cut off (pT1a <3cm, pT1b <3cm)
pT2	Epididymal invasion upstaged from T1 Hilar soft tissue invasion added Lymphovascular invasion only in spermatic cord without parenchymal invasion
M1	Discontinuous involvement of spermatic cord by lymphovascular invasion added

Management of testicular tumors

00:17:38

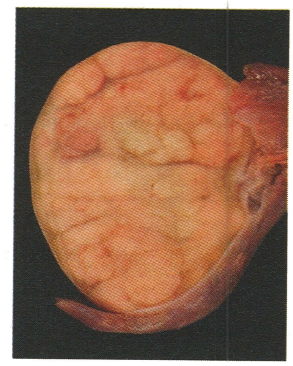
Overview :

High inguinal orchidectomy done in :

- Seminomatous tumours.
- Non seminomatous tumours.

Seminomatous tumours

- more common and assume very large size.
- Homogeneously enlarged testis with areas of haemorrhage & necrosis.



Seminoma

Note : Staging done with CECT thorax, abdomen & pelvis.

----- Active space -----

Types :

- Classical : Shows lymphocytic infiltration.
  - Good prognostic feature.
  - Highly radiosensitive.
- Anaplastic.
- Spermatocytic :
  - Seen beyond 60 years.
  - Does not develop from intra tubular germ cell neoplasm.

Other features :

- If AFP is raised in seminoma, it is a mixed tumour and treated as non seminomatous germ cell tumour.
- Placental ALP raised.
- CD117 positive.
- Highly radiosensitive.

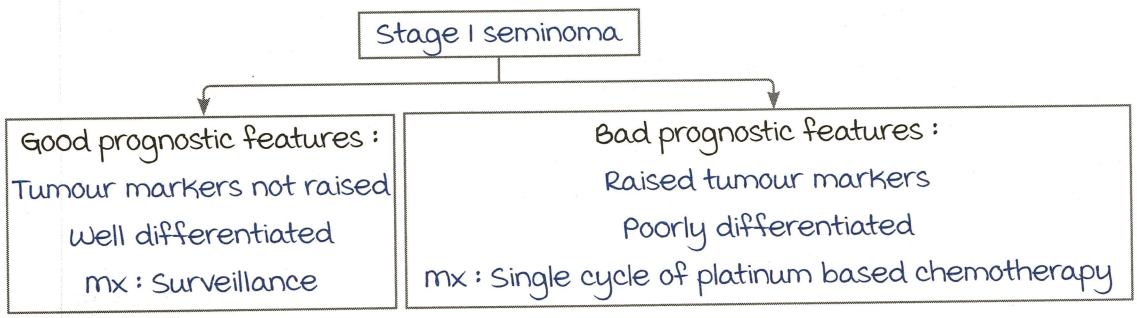
Non seminomatous germ cell tumour :

- Yolk sac tumour :
  - most common in pre pubertal age group.
  - Histopathology : Schiller-Duval bodies.
- Teratoma : Highly chemosensitive and raised AFP levels.

management of seminomatous GCT :

Stage I :

Restricted to testis and no nodal involvement.



Stage II seminoma :

- Retroperitoneal lymph nodes present.
- Radiotherapy (30 Grey) to retroperitoneal lymph nodes.
- Given in an inverted Y fashion.
- If residual lymph nodes present after radiotherapy : Chemotherapy done.