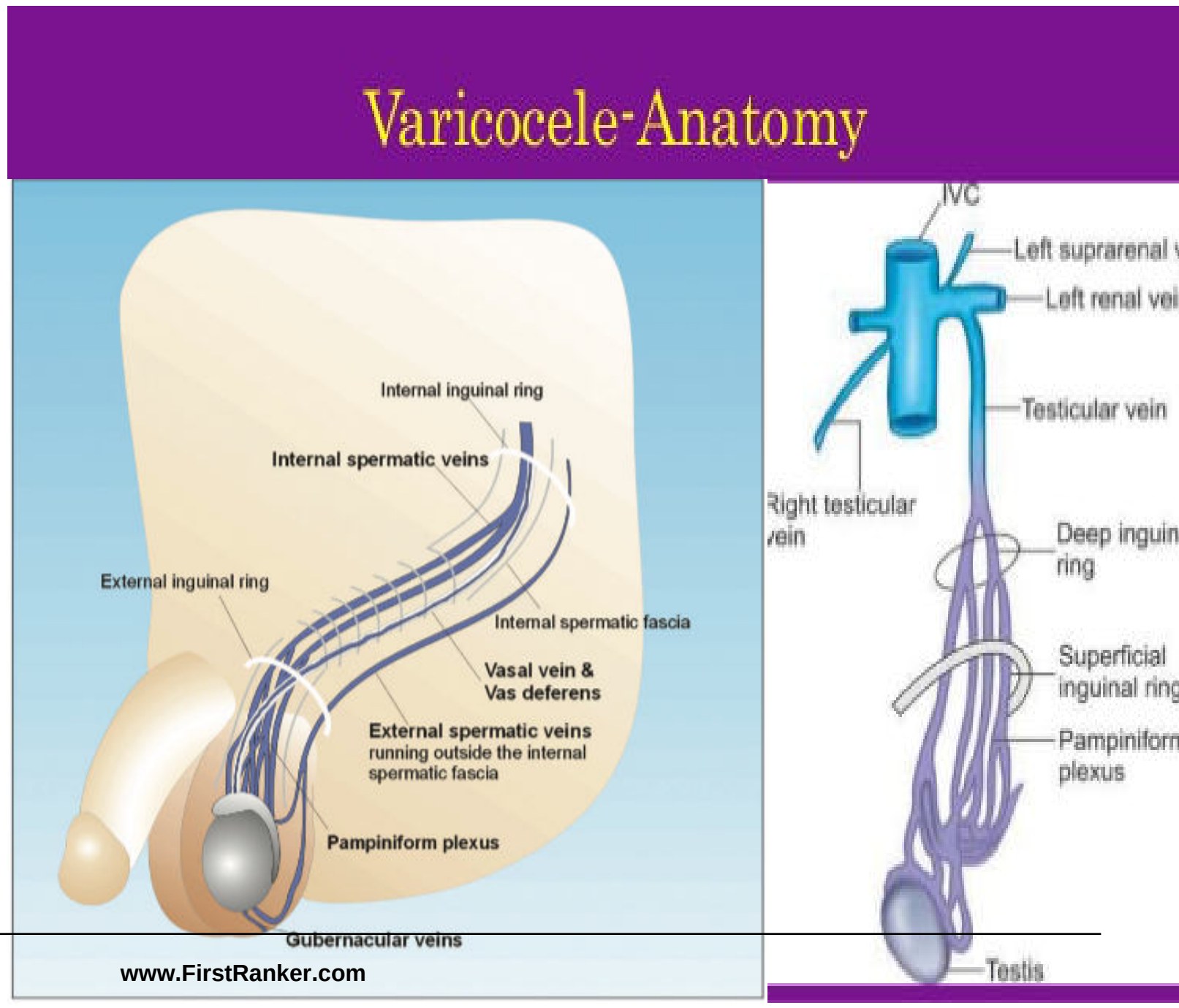
VARICOCOELE

- Union of multiple spermatic veins from back of testes and epididymis
- Ascend along cord infront of ductus deferens below the superficial inguinal ring.they unite to form 3-4 veins-inguinal canal- enter abdomen through deep ring -form 2 veins which unite to form testicular vein
- Left vein drain into renal ~~vein and right vein drain into~~ IVC



What is varicocoele

- Dilatation and tortuosity of pampiniform plexus and so also of testicular veins

- Seen commonly in men aged 15-30 years and rarely after 40 years

- Occur in 15-20% of all males and 40 % of all infertile males

- Normal small vessels of plexus measures 0.5-1.5 mm, diameter greater than 2 mm- varicocoele

- Most common correctable cause of male infertility

- Affects 19 to 41% of men with primary infertility and 45 to 81% of men with secondary infertility.

- Etiology and pathophysiology of varicoceles remain incompletely understood with only a few understudied theories

- Seen commonly on left side
  - ➢Longer
  - ➢Enters at right angle to renal vein
  - ➢Arching of left testicular artery
  - ➢Loaded sigmoid colon
  - ➢Compressed between aorta and SMA

History

- First recognized as a clinical problem in 16th century
- Relationship between infertility and varicocele proposed in late 19th century
  - thereafter, others reported association with arrest of sperm secretion and the subsequent restoration of fertility following repair
- Enlarged scrotal veins in teenagers referenced as early as 1885

- 1950s → report of fertility following varicocele repair in an individual known to be azoospermic
  - surgical correction as clinical approach to certain kinds of male infertility gained support among American surgeons

- Continued research documented recurrent pattern of low sperm count, poor motility, and predominance of abnormal sperm forms (stress pattern of semen)
  - not specific to varicocele
  - suggests early evidence of testicular damage

Etiology -three commonly accepted theories

✓Differences between left and right testicular venous drainage anatomy:

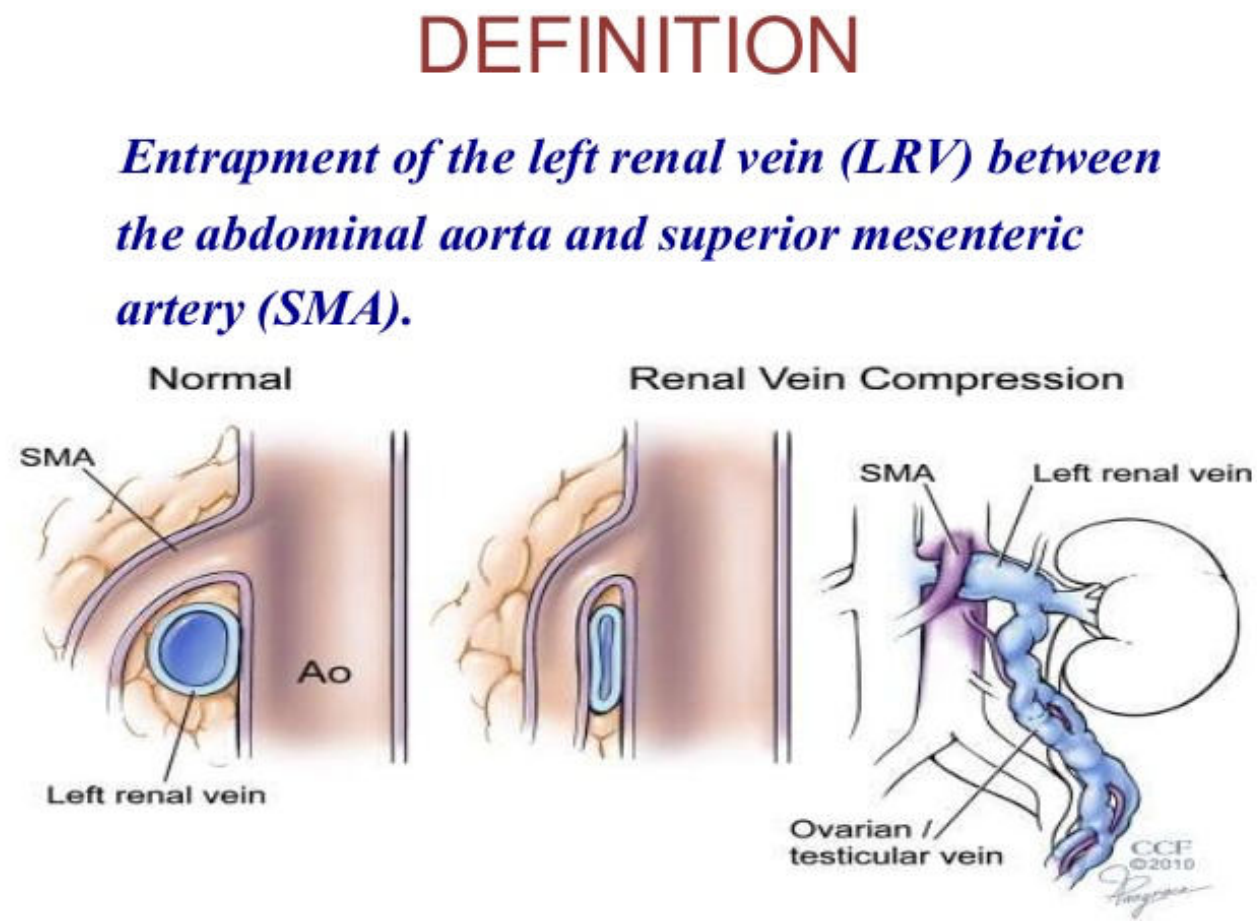
The left internal spermatic vein has about 8-10 mm H2O higher blood pressure and relatively slower blood flow compared with the right side. This is mainly caused by the drainage of the left testicular vein to the left renal vein with a perpendicular angle, whereas in the right testicular vein the drainage is to the vena cava at a steeper angle. This causes less cranial venous drainage.

✓Venous reflux:

Reflux to the pampiniform plexus is caused by the lack of valves in the internal spermatic vein and/or the reflux caused by venous collateral flow.

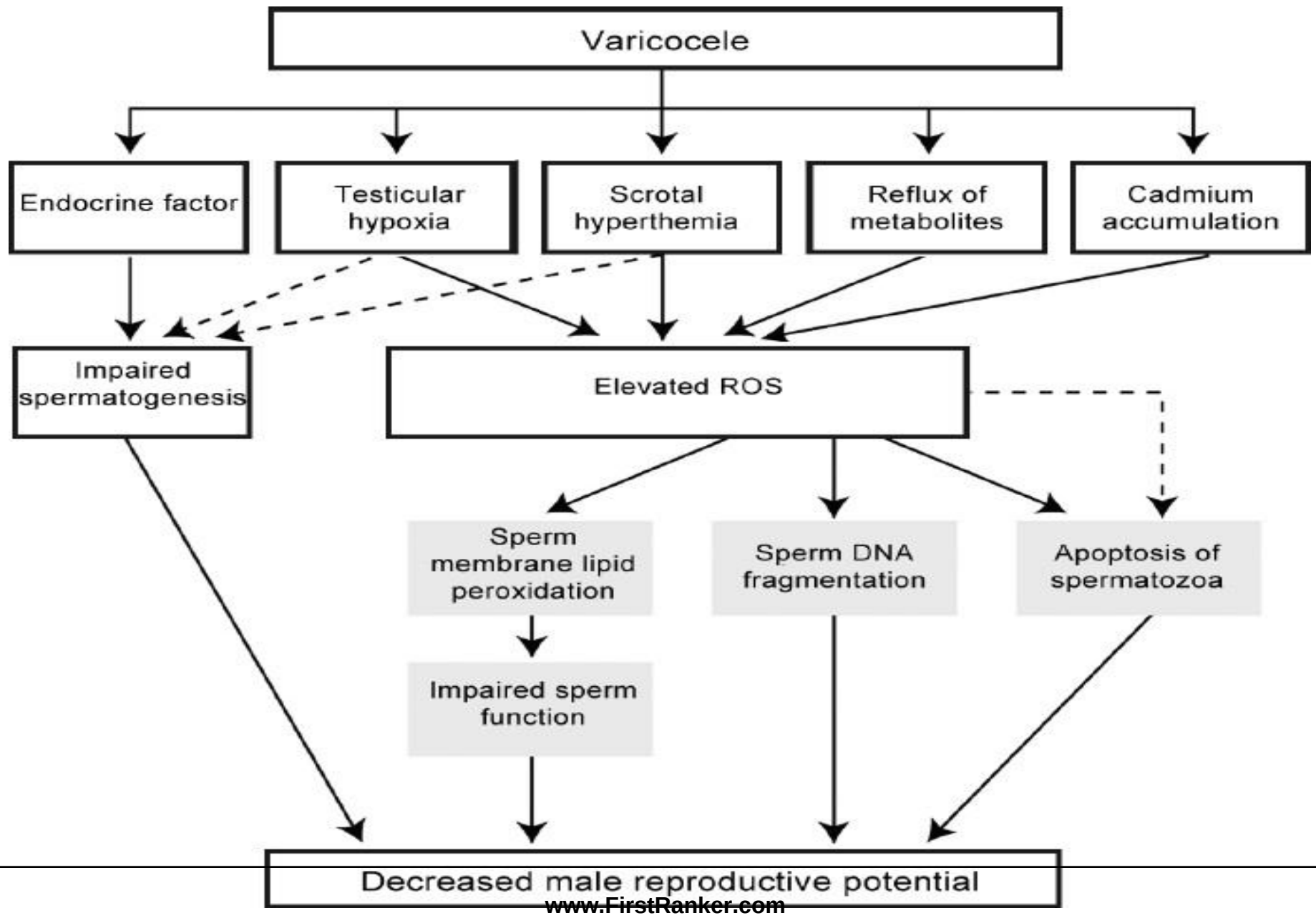
✓Partial obstruction of testicular veins:

This phenomenon, called ‘the nutcracker phenomenon,’ occurs when a specific vein is compressed by arteries. In proximal type, the left renal vein is compressed by the aorta and the superior mesenteric artery. In distal type, the left common iliac artery compresses the left common iliac vein.



Pathophysiology

- Increased blood flow in patients with varicocele compared with healthy controls in colour Doppler studies.
- An increase in interstitial fluid -increased number of leukocytes potentially attributable to this increase.
- Higher testicular temperature
- Increased venous pressure
- Higher apoptotic index
- Impairment of the blood— testis barrier, which leads to the formation of anti-sperm antibodies.15



TYPES

- 1.IDIOPATHIC/PRIMARY
  - due to incompetency of valves
  - 98 % on left side

- 2. SECONDARY- Pelvic or abdominal mmass
  -left renal cell carcinoma with tumor thrombus in left vein
  - nutcracker syndrome- SMA compressing left vein

Clinical features

- Swelling
- Dragging/aching pain in groin and scrotum
- Bag of worms feeling
- Scrotum on affected side hangs down
- Bow sign- hold varicocoele b/w thumb and fingers- reduced in size
- Cough impulse present
- Long standing cases- affected testes is reduced in size and softer
- Fertility problems

Grade	Examination
Subclinical	Not visible, not palpable
Grade I	Palpable varicocele detected upon Valsalva maneuver, not visible
Grade II	Palpable varicocele detected while standing up, not visible
Grade III	Large visible varicocele while standing up

Varicocoele and subfertility

- Altered heat exchange mechanism due to stagnation- hypothermia- inhibition of spermatogenesis
- Increased temperature – increased metabolic activity- depletion of glycogen storage- injury to parenchyma of testes-oligospermia
- Hypoxia, Leydig cell dysfunction- low testosterone
- Maturation arrest- poor spermatogenesis

Investigations

- Venous doppler of scrotum and groin- standing/Valsalva manouevre
- Doppler Criteria

✓dilation of spermatic veins with demonstration of reversal of flow with color Doppler

✓ cutoffs between normal and abnormal veins are 2 to 3 mm in diameter

✓Dilation of veins without demonstrated reversal of flow on color Doppler does not represent a varicocele,

- USG Abdomen

- Semen analysis

- Hormone laboratory testing

✓ total and free testosterone levels,

✓ luteinizing and follicle-stimulating hormones,

✓prolactin level,

✓estrogen (E2) level.

Although a patient with clinical varicocele may exhibit laboratory results consistent with hypergonadotropic hypogonadism, it is important to consider other causes for infertility based on these results.

Management

- Presence of a varicocele does not necessitate surgical correction
- Indications for surgical correction
  - Relief of significant testicular discomfort or pain not responsive to routine symptomatic treatment
  - testicular atrophy (volume difference >20% or > 2cc)
  - possible contribution to unexplained male infertility
  - varicocele may cause progressive damage to testes, resulting in further atrophy and impairment of seminal parameters

Management

- The AUA Male Infertility Best Practice Policy Committee recommends treatment be offered to the male partner when all the following are present:
  - varicocele is palpable
  - couple has documented infertility
  - female has normal fertility
  - one or more abnormal semen parameters or sperm function test results
- men who have a palpable varicocele and abnormal semen analyses findings but are not currently attempting to conceive should also be offered varicocele repair

Management- ADOLESCENTS

- No strict criteria necessitate surgical intervention in adolescents
- Each case handled individually
  - discussion among patient, parents, and physician regarding risks of intervention and potential impact on future fertility
- general guidelines used by some pediatric urologist include the presence of one or more of the following:
  - Varicocele associated with decreased ipsilateral testicular size (20% volume deficit in the involved testis)
  - Bilateral varicoceles
  - Symptomatic painful varicocele
  - Abnormal findings on semen analysis

Varicocele

- Lipshultz and Corriere (1997)
  - suggested that varicoceles were associated with testicular atrophy that was progressive with age
  - observed that testicular biopsy specimens taken from prepubertal boys with varicoceles already revealed histologic abnormalities
- Kass and Belman (1987)
  - first to demonstrate significant increase in testicular volume after varicocele repair in adolescents
  - did not study semen parameters

Management Options

- Treatment options for varicocele can be divided into two major categories
- (1) percutaneous occlusion, by intravenous injection of various materials to occlude the varicoceles
- (2) surgical ligation or clipping of the varicoceles to prevent venous reflux.

Embolization/Sclerotherapy

Percutaneous Embolization

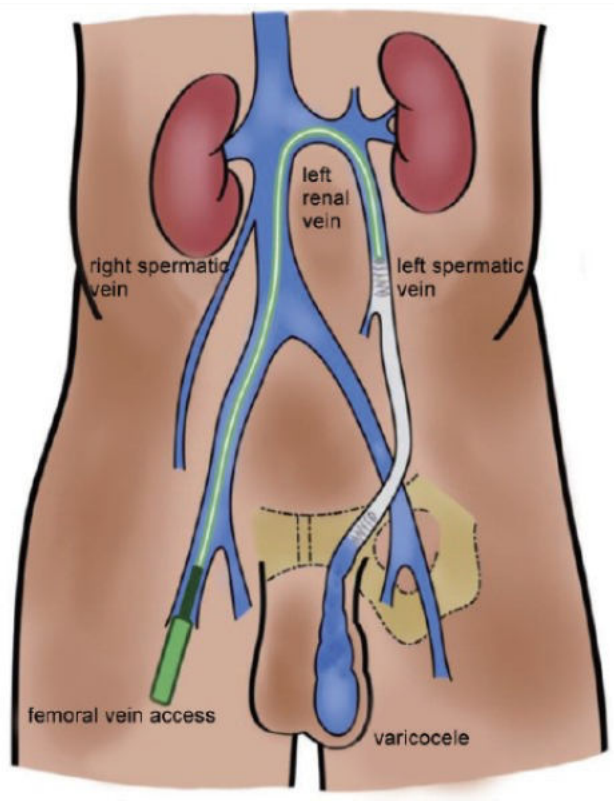
- described over three decades ago
- retrograde occlusion /anterograde technique.
- Least invasive means of varicocele repair
- Internal spermatic vein accessed via cannulation of femoral vein
  - balloon and/or coil occlusion of varicocele
- failure rate of up to 15%

Antegrade sclerotherapy

- success rate is > 90%
- hydroceles are not a complication

Retrograde Approach

- the right femoral vein is punctured to insert an angiocatheter to gain access to the internal spermatic vein via the inferior vena cava and the left renal vein. On confirming the anatomy and the presence of reflux in the testicular vein, it is occluded in a retrograde fashion (i.e., against the natural direction of the internal spermatic venous return).



Advantages

- Suitable treatment option for persistent/recurrent varicoceles post surgical repair.
- Use of imaging techniques -identify the cause of varicocele recurrence allows accurate venous occlusion

  -eliminate need for a difficult dissection of the fibrous adhesions from previous surgery.

- Faster return to normal activity
- Inexpensive sclerosing agents
- Newer Agents-sclerosing foam,occlusive balloons, detachable coils

Antegrade Sclerotherapy

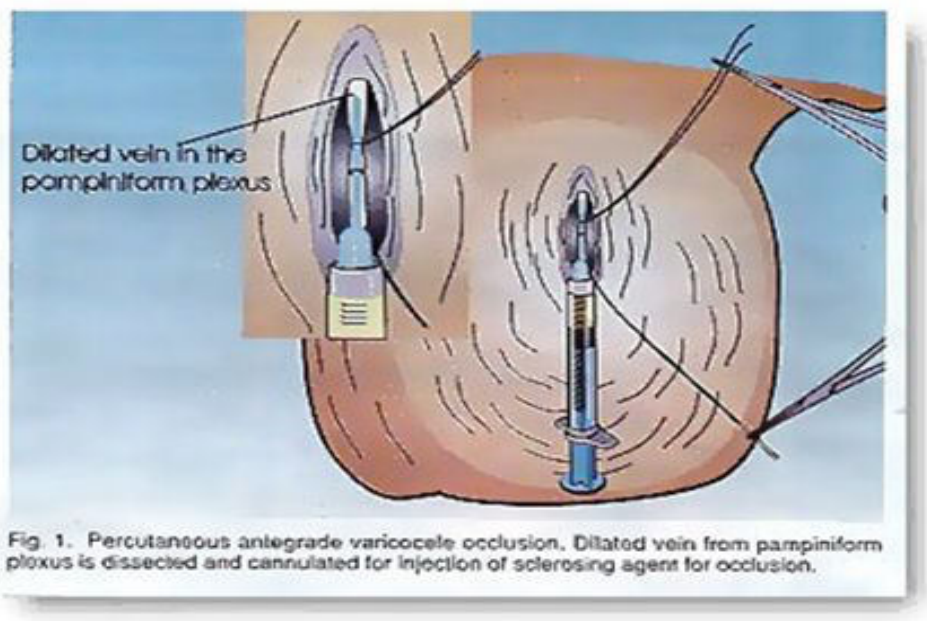
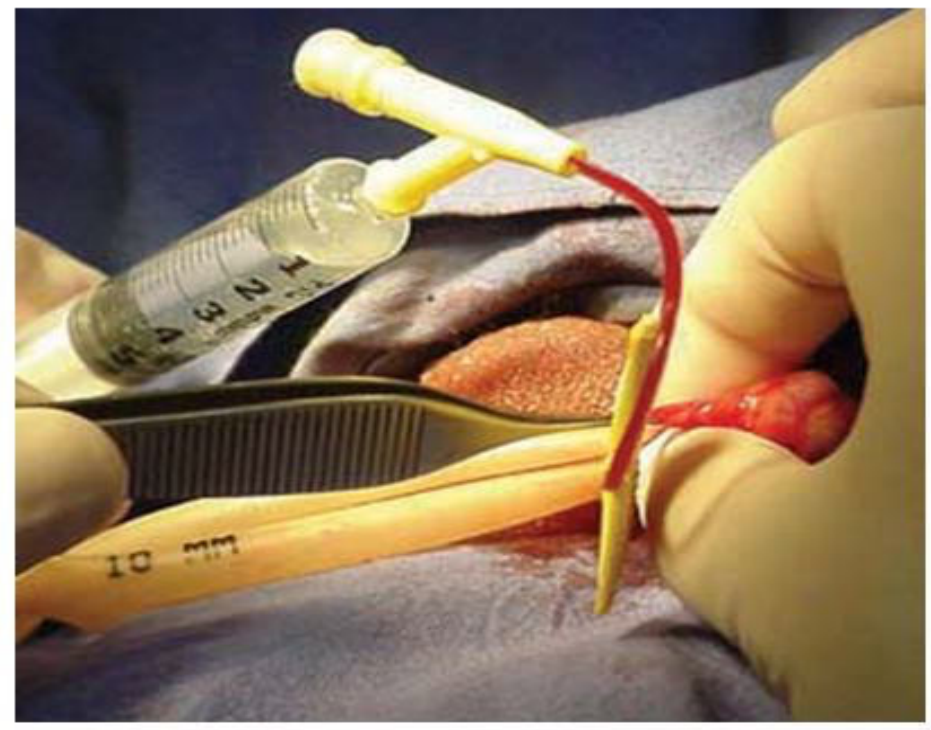


Fig. 1. Percutaneous antegrade varicocele occlusion. Dilated vein from pampiniform plexus is dissected and cannulated for injection of sclerosing agent for occlusion.



Antegrade approach

- lower operating time (10–15 min)
- lower unperformable and overall persistence/recurrence rate (5–9%)
- COMPLICATIONS

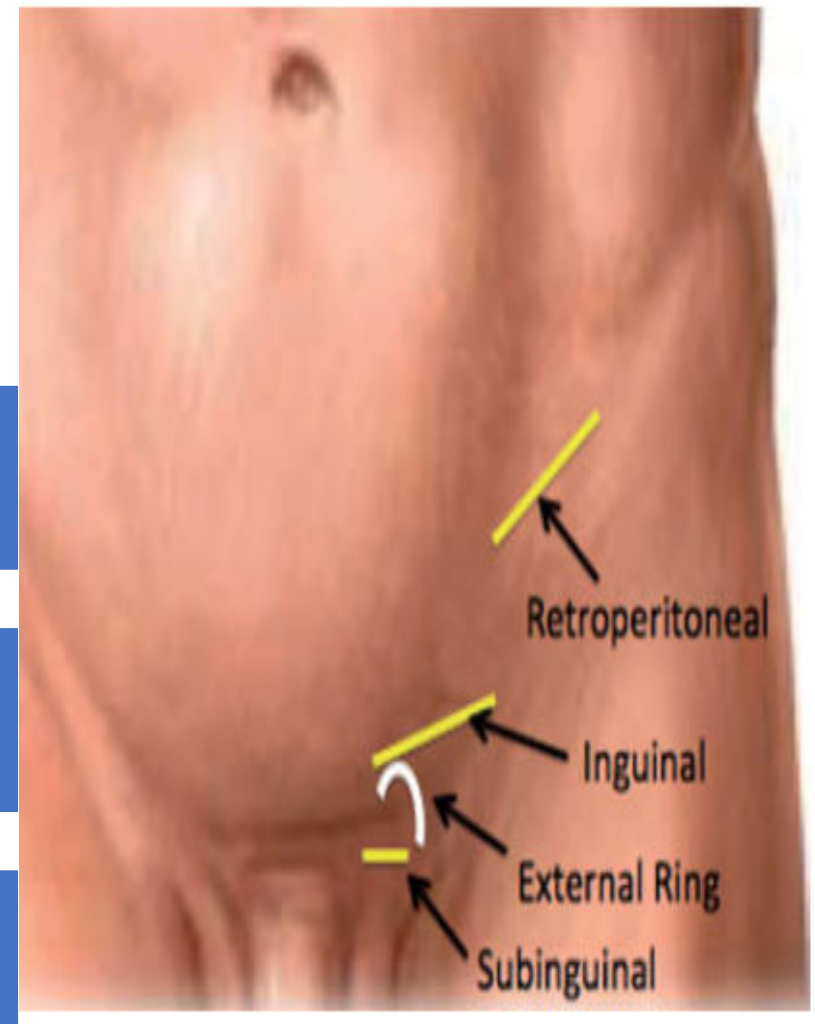
-testicular atrophy post-treatment, presumably secondary to unidentified arterial injury,

-need of an incision, most commonly at the suprascrotal /Subinguinal level

-radiation exposure during the embolization

Methods of Surgical repair

- Scrotal approach
- Retroperitoneal (open or laparoscopic) approach
- inguinal approach
- Subinguinal approach



Scrotal approach

- The very 1st approach for varicocoele repair employed in the early 1900s
- Involve mass ligation and Excision of varicosed veins
- Not preferred practically due to high incidence of testicular artery injury with subsequent impairment of blood supply, testicular atrophy, spermatogenesis and fertility

Retroperitoneal (Palomo) Approach

- Incision at the level of internal inguinal ring near to anterior superior liac spine
- Splitting of External & Internal Oblique Muscle
- Exposure of the Internal spermatic artery & vein retroperitoneally near ureter where only one or two large veins are present & the testicular artery is not yet branched and so easy to separate
- High recurrence rate-15% due to preservation of testicular artery & peri-arterial venae comitantes
- Recurrence is prevented by intentional artery ligation

Laparoscopic Approach

It is an essence retroperitoneal approach with similar advantages and disadvantages

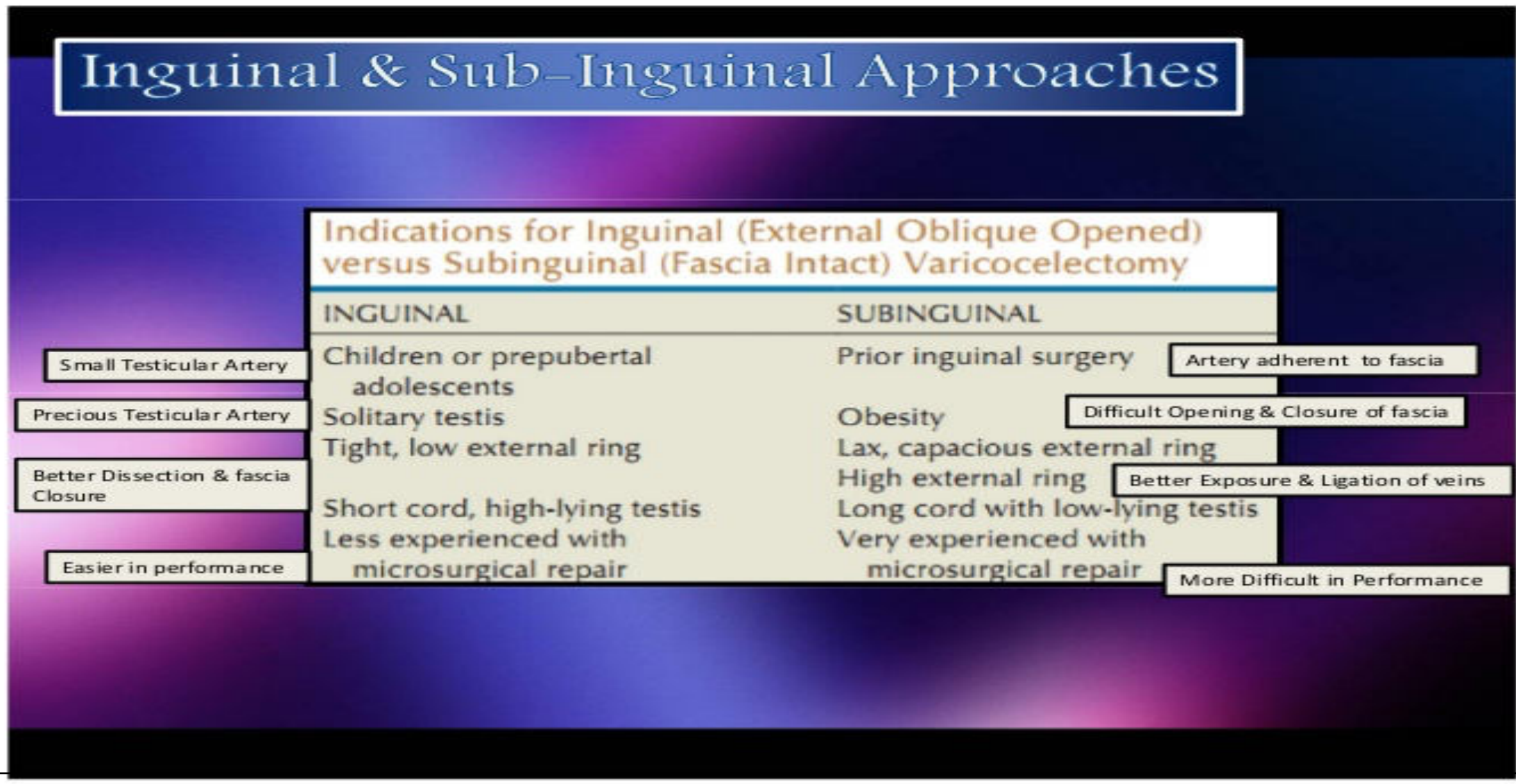
The internal spermatic veins are ligated with the laparoscope at the same level as the retroperotoneal approach with preservation of testicular artery

The magnification by laparoscope allows visualization of testicular artery.with experience the lymphatics may also be preserved, thereby preventing hydrocoele formation

Additional possible complications- visceral and vascular injury, air embolism and peritonitis

Inguinal & Subinguinal Approach

- Allows access to external spermatic and gubernacular veins which causes recurrences if not ligated
- Microsurgical varicocoelectomies result in marked decrease in incidence of secondary Hydrocoele formation due to easy identification of lymphatics.
- Easy identification of testicular artery helps avoiding testicular atrophy and azoospermia



Inguinal & Subinguinal Approach

Incision:

- *Inguinal* :The incision begins at external ring and extended laterally 2-3.5 cm along langer lines

- *Sub-Inguinal*: the incision is placed in the skin lines just below the external ring.

- Camper's & Scarpa fascia are divided, superficial Epigastric Artery or vein are retracted or ligated

Inguinal & Subinguinal Approach

In the inguinal Approach

- The External Oblique aponeuroses is opened along the length of the wound in the direction of its fibers
- Grasping of the spermatic cord & delivery of it through the wound to be surrounded with a penrose drain after sparing of ilioinguinal nerve and genital branch of genito-femoral nerve

Inguinal & Subinguinal Approach

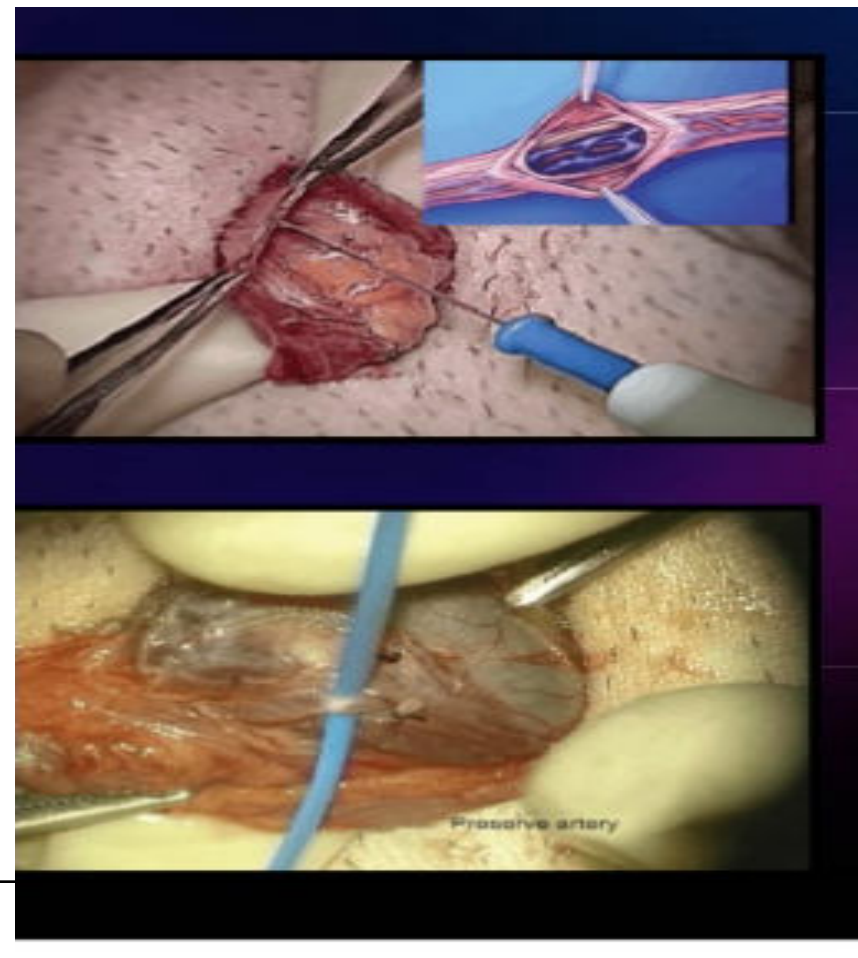
In the Subinguinal Approach

- An index finger is introduced into the wound along the cord into the scrotum and cord is hooked under external inguinal ring
- The Spermatic cord will be revealed between the index finger and retractor, delivered and then surrounded with a large penrose drain

Inguinal & Subinguinal Approach

Dissection of Cord

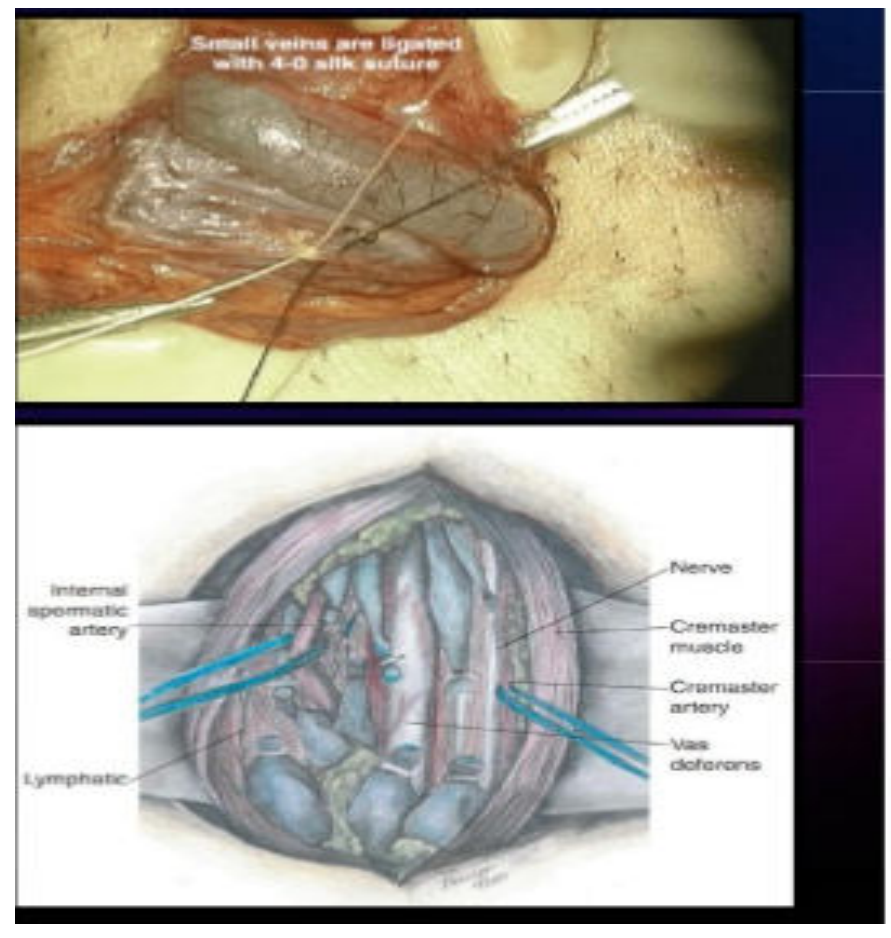
- The Internal & external spermatic fascias are opened & the cord is inspected for pulsation of the testicular artery to be dissected away
- The Cord veins are dissected starting with large veins with taking care of possible adherent testicular arterey



Inguinal & Subinguinal Approach

Dissection of Cord

- All veins are ligated except the vasal veins with 4-0 silk ligatures or cauterized

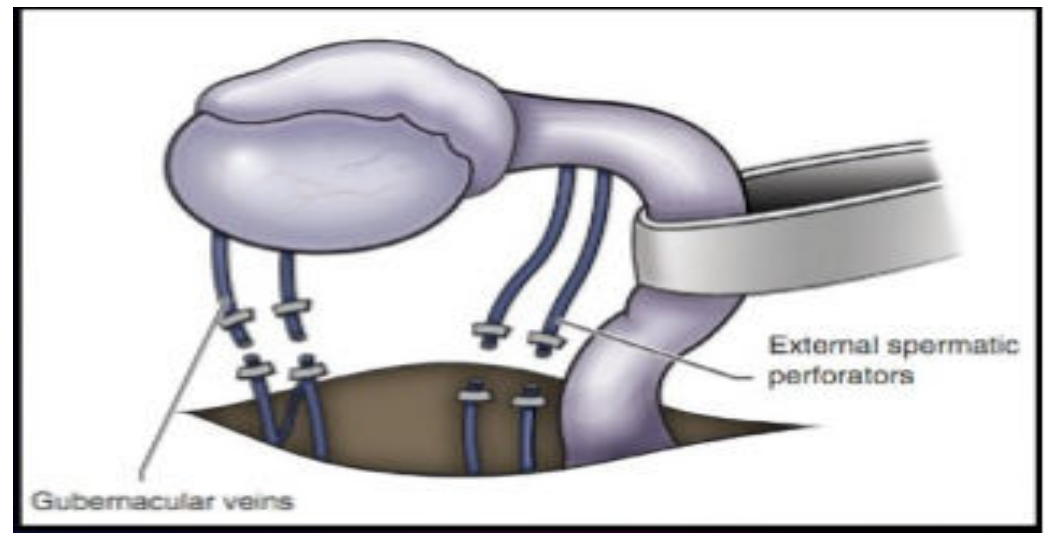


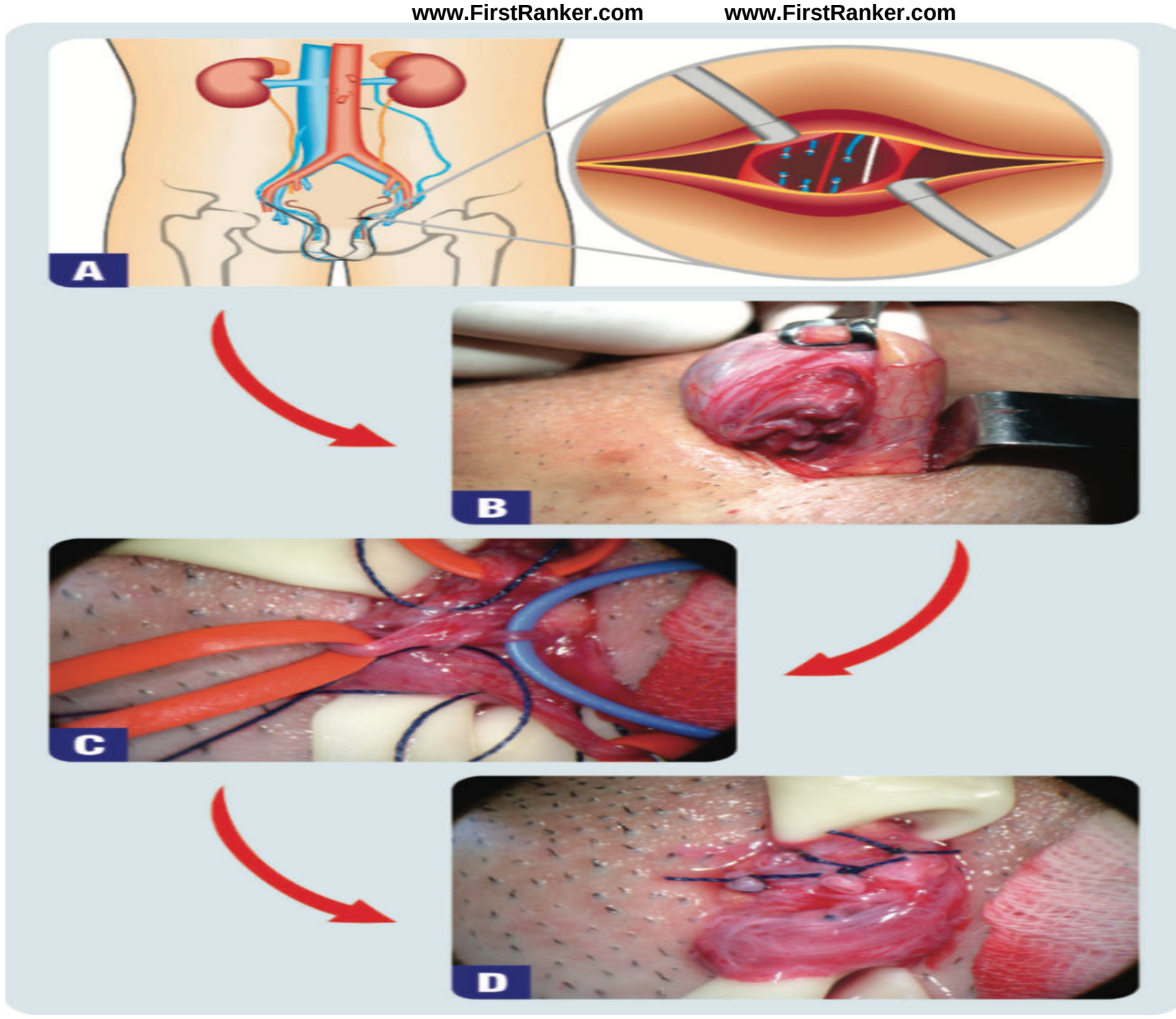
- After complete dissection only the testicular artery,cremastric arteries , cremastric muscle fibres, nerves, lymphatics and vas deferens with its vessels should remain

Inguinal & Subinguinal Approach

Delivery of the Testes

- Delivery of the testes through a small inguinal inguinal or subinguinal incision guarantees direct access to all veins close to the testes
- Associated hydrocoele(15%) can alter testicular temperature regulation, so should be repaired if noticed with delivery of the testes .

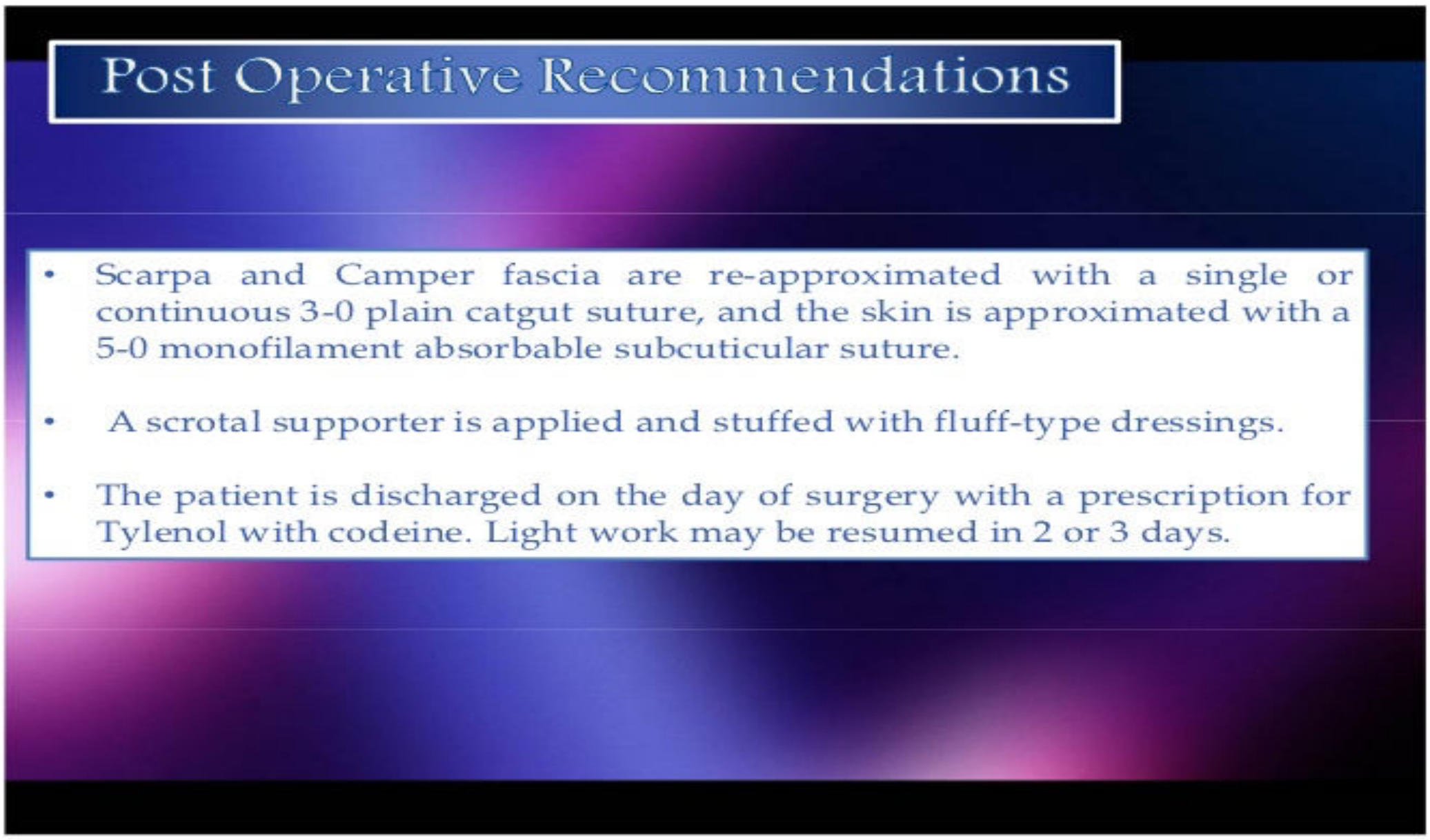




Inguinal & Sub-Inguinal Approaches

Special Tools

- The Magnification Microscope with 10-25 power magnification.
- The Micro-Doppler is very useeful for identifiying the testicular artery.
- The Automatic Clip Applier for ligation of the veins especially smaller veins.



Robotic varicocoelectomy

Advantages of the robotic approach

- (1) 3-dimentional optics to allow improved precision of dissection,
- (2) enhanced stability and ergonomics of instrument handling for surgeons to overcome the limited mobility imposed by the use of straight laparoscopic instruments
- (3) increased degree of freedom in the range and extent of instrument manipulation.

Hydrocoele

- The most common complication -3-33%(7 %)
- Due to lymphatic obstruction
- Creates a insulating layer around testes impairing efficiency of counter current heat exchange obviating benefit of varicocoelectomy
- Use of magnification helps

Testicular Artery Injury

- The testicular artery forms 2/3 of blood supply to testes
- Is 1- 1.5 mm in diameter, adherent to a large spermatic vein & surrounded by a network of tiny veins
- Injury or ligation carries a risk of testicular atrophy
- The use of magnification and micro- doppler helps good identification and preservation of the testicular artery

Recurrence

- The incidence of recurrence after varicocoele repair varies from 0.6% to 45%

- Recurrence is mostly associated with :

1. Pediatric varicocoele
2. Non –magnified operations
3. Retroperitoneal approaches