

LYMPHATIC BASIN-

ANATOMY &

ONCOLOGICAL

Dr.S.G.Balamurugan,M.Ch.,
APPLICATION

**Asst. professor, Dept.of Surgical oncology
Govt.Rajaji hospital – Madurai**

PRINCIPLES



*The most selfish one letter
word.....*

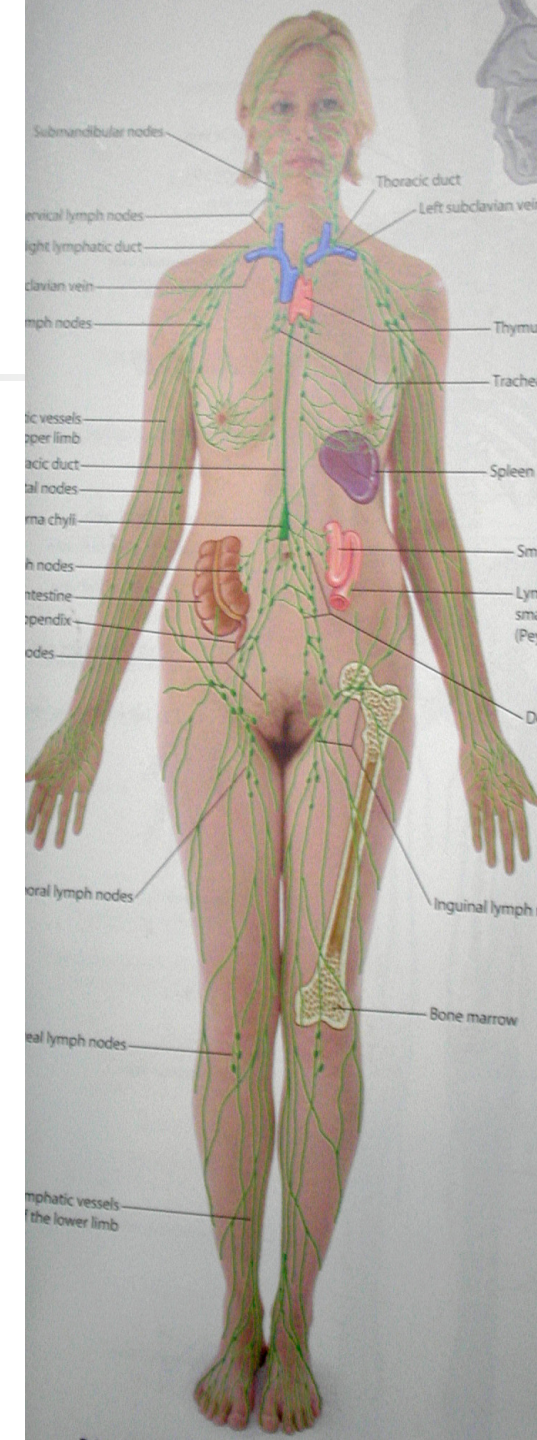
"I"

AVOID IT.

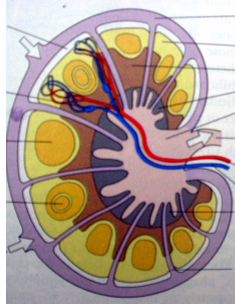


- Lymphatic basin:

- group of lymph nodes that drain the specific anatomical region



NODAL STATES WITH SIZE



- Isolated tumor cell _ <0.2 mm
- Micrometastasis – 0.2mm to 2mm
- Normal size node – 1cm
- Size visible by imaging and palpable – 2cm
- Extracapsular disease – 3cm

NODAL STATES WITH TUMOR BURDEN



- Micrometastasis:

- Node neither palpable not detected by imaging

- Macrometastasis:

- Palpable nodes

- Extracapsular spread: (Capsular breach)

- 3cm node / fixed / with neurovascular deficit

- Fungating node

EXTRACAPSULAR NODE



FUNGATING NODE



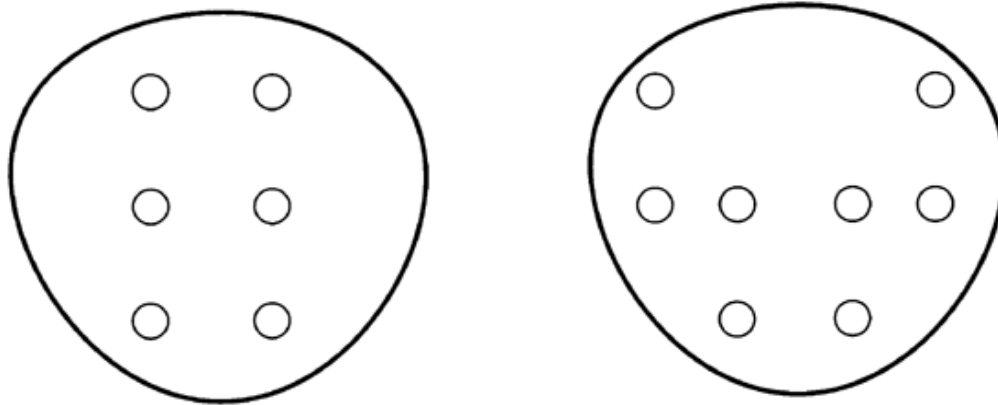
NODAL STATES WITH TUMOR BURDEN

ONCOLOGICAL APPLICATION

- Micrometastasis:
 - Prophylactic block dissection
- Macrometastasis:
 - Comprehensive block dissection +/-RT
- Extracapsular spread: (Capsular breach)
 - Comprehensive block dissection + RT
- Fungating node:
 - Palliative treatment

NODAL METASTASIS - PATTERN

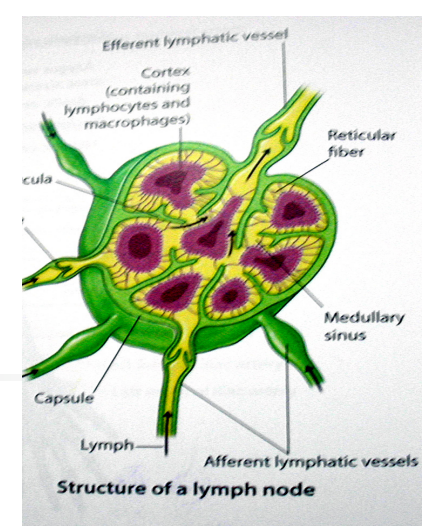
- Nodal metastasis has a patchy distribution & multifocal



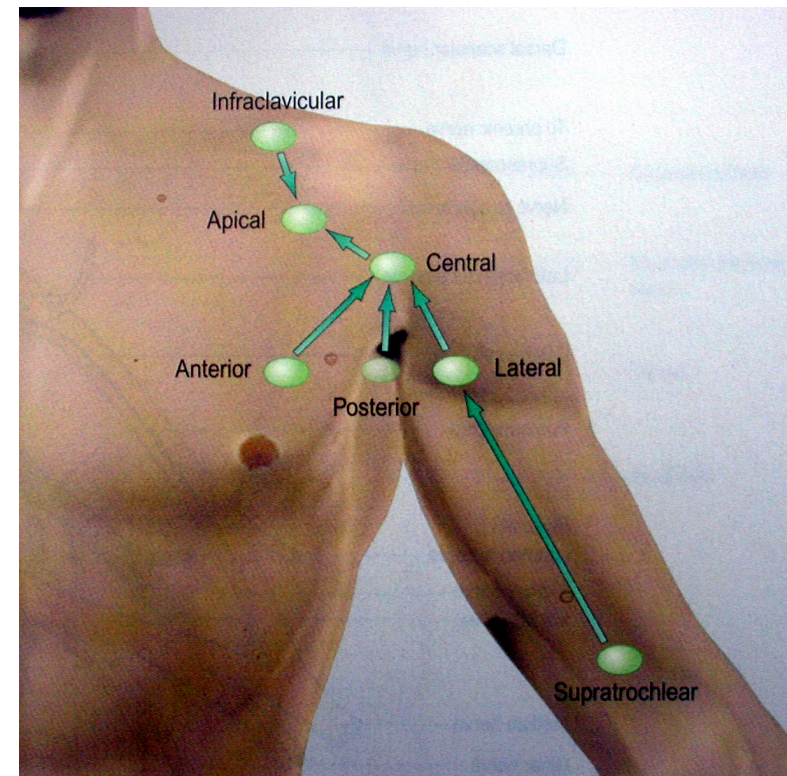
ONCOLOGICAL APPLICATION

- Hence FNAC is not an ideal investigation to identify nodal mets

LYMPHATIC PATTERN

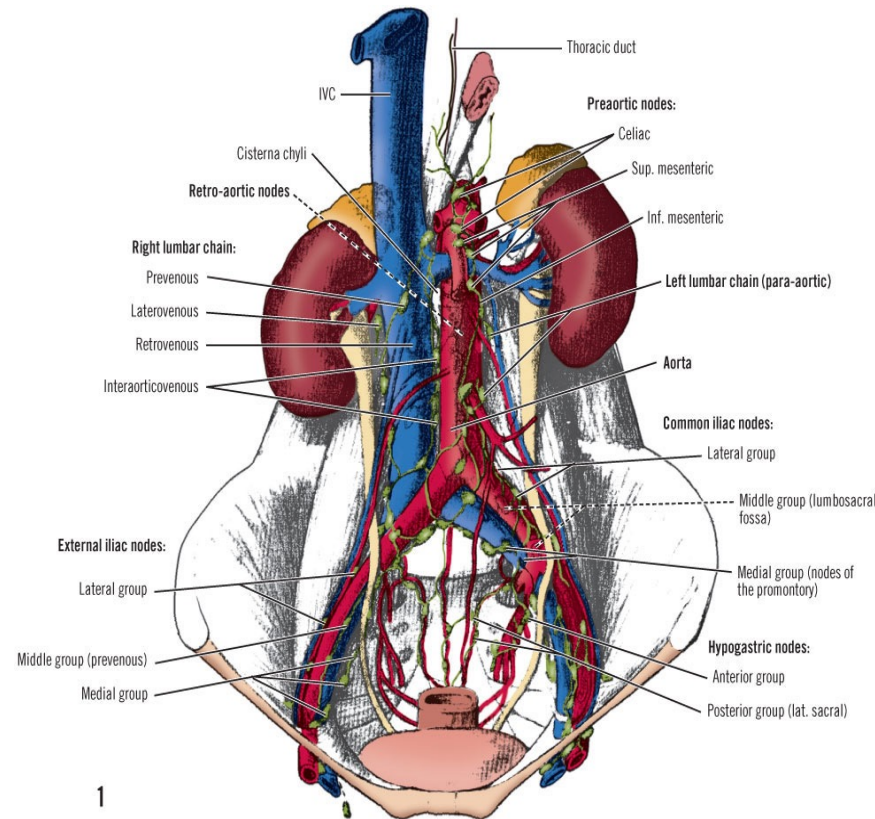


- Tumor spread via the lymphatics in the orderly step wise pattern
- First draining node is – Echleon node (Sentinal Node)
- Retrograde lymphatic spread occur when lymphatic pathway is blocked



LYMPHATIC PATTERN

- Superficial Lymphatic passes along the vein
- Deep Lymphatic / visceral Lymphatic passes along the arteries
- All the lymph Nodes draining the viscera situated along the arteries





ONCOLOGICAL APPLICATION

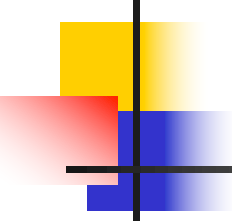
- In Pancreatic cancer SMA involvement is a C/I for surgery whereas SMV involvement is not
- The autonomic nerve plexus and lymphatic channel passes only around the artery & not vein
- If artery is involved this neurolymphatics is also involved. So tumor clearance is not possible

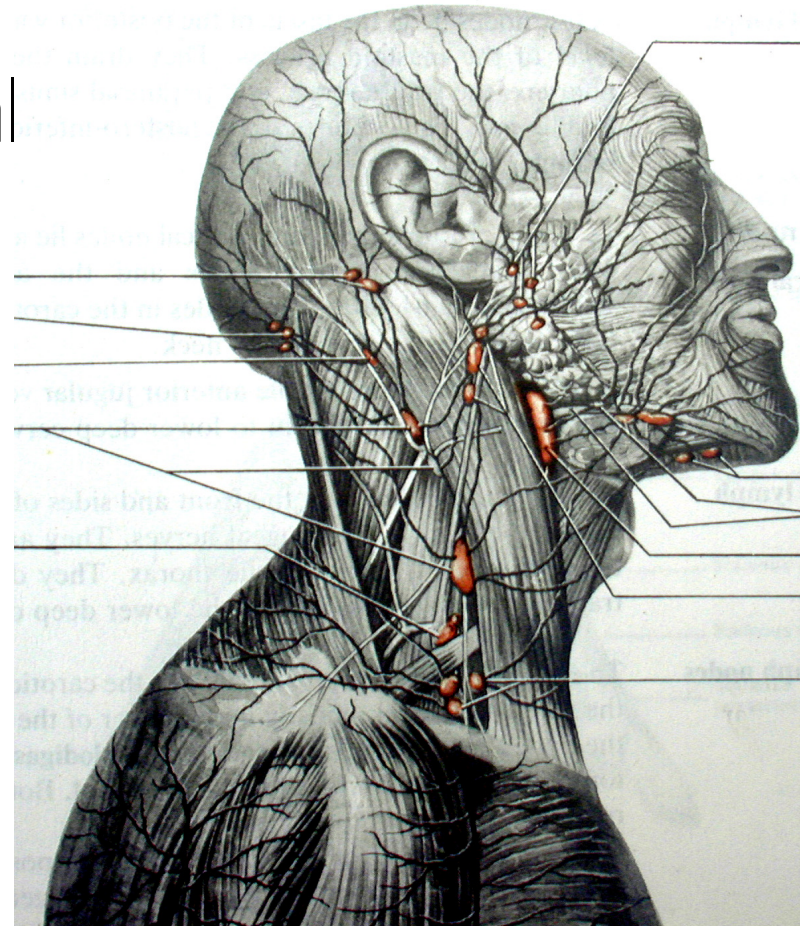
CERVICAL REGIN

*The most satisfying two-letter
word.....*

"WE"

USE IT.

- 
-
- Skin drain in to superficial group of nodes
 - Mucosa drains in to deep group of nodes





ONCOLOGICAL APPLICATION

- Since anterior half of the face & scalp drains into the intraparotid node, superficial parotidectomy should be done for nodal clearance for cutaneous malignancy

SURGICAL ANATOMY-NECK NODES

Levels of neck nodes

- Level I A submental & submandibular
- Level II upper deep cervical
- Level III middle cervical
- Level IV lower deep
- Level V posterior triangle
- Level VI central neck
- Level VII superior mediastinal

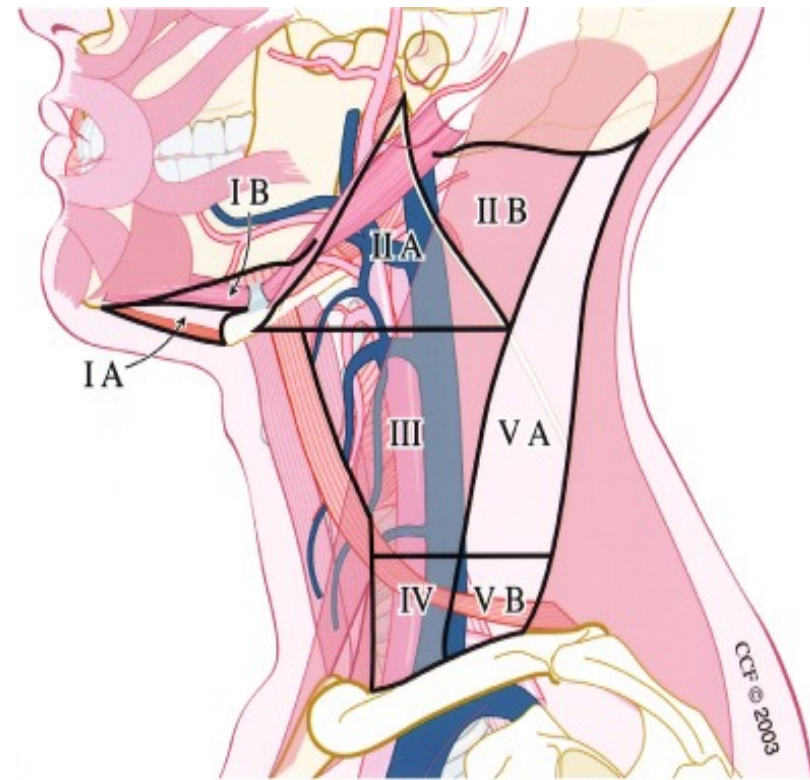


SURGICAL ANATOMY-NECK NODES

Level I

■ Boundaries :

- Ia : triangular area between the both anterior belly of digastric muscel & hyoid
- Ib : area between the anterior belly, posterior belly of digastric & mandible



Copyright © 2004, Elsevier.

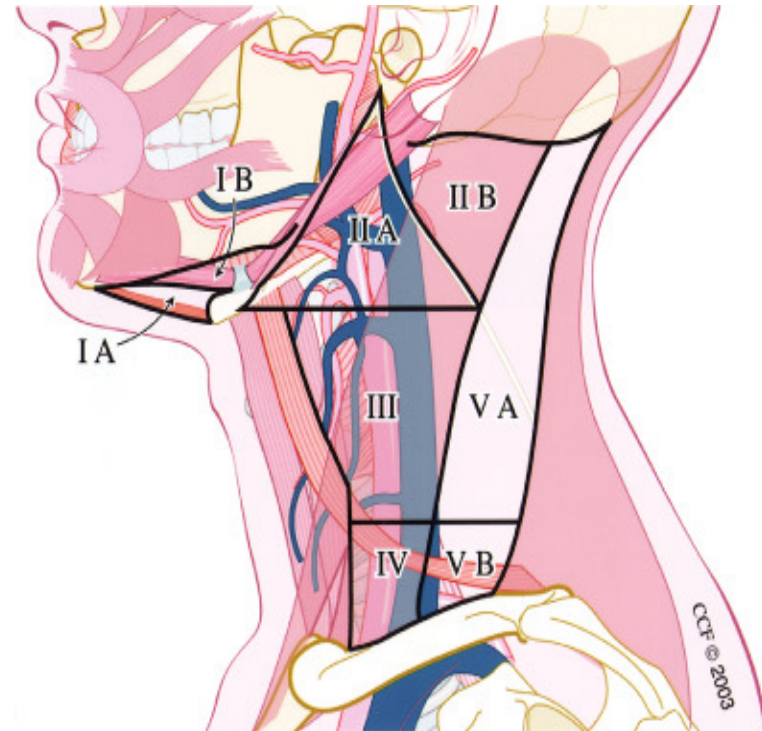
SURGICAL ANATOMY-NECK NODES

Level II,III & IV

Anterior – lateral border of strap muscles

Posterior – posterior border of SCM

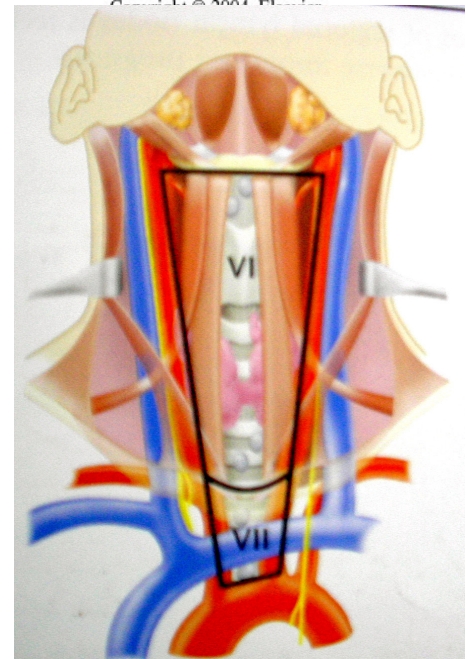
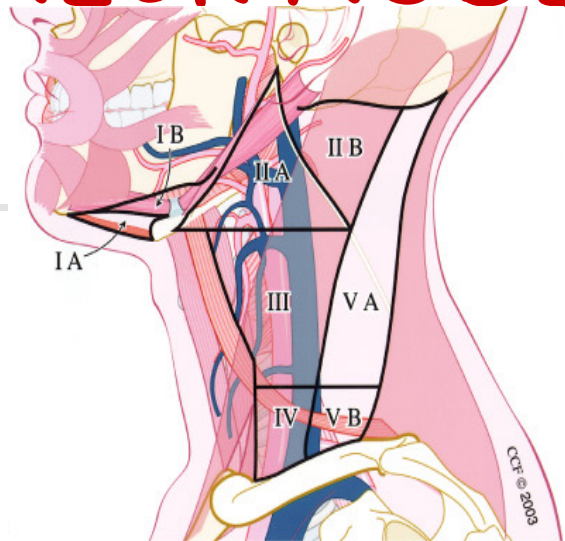
- Level II
 - Inbetween base of skull & carotid bifurcation
- Level III
 - Inbetween carotid bifurcation & omohyoid tendon
- Level IV
 - Omohyoid tendon & clavicle



SURGICAL ANATOMY-NECK NODES

Level V, VI & VII

- Level V
 - Anterior border of trapezius
 - Posterior border of sternomastoid
 - Clavicle
- Level VI
 - Superior – hyoid
 - Inferior – sternal notch
 - Laterally – carotid sheath
- Level VII
 - Superior – sternal notch
 - Inferiorly- innominate vein
 - Laterally – carotid sheath



NECK DISSECTION BASED ON ANATOMY

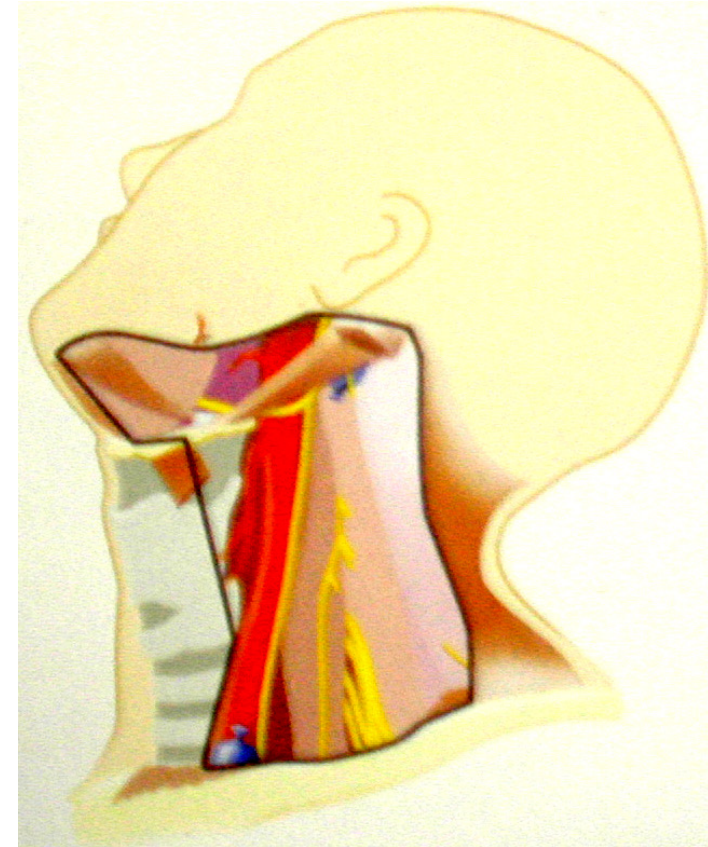


- Comprehensive neck dissection
 - Radical neck dissection
 - Extended radical neck dissection
 - Modified radical neck dissection
- Selective neck dissection

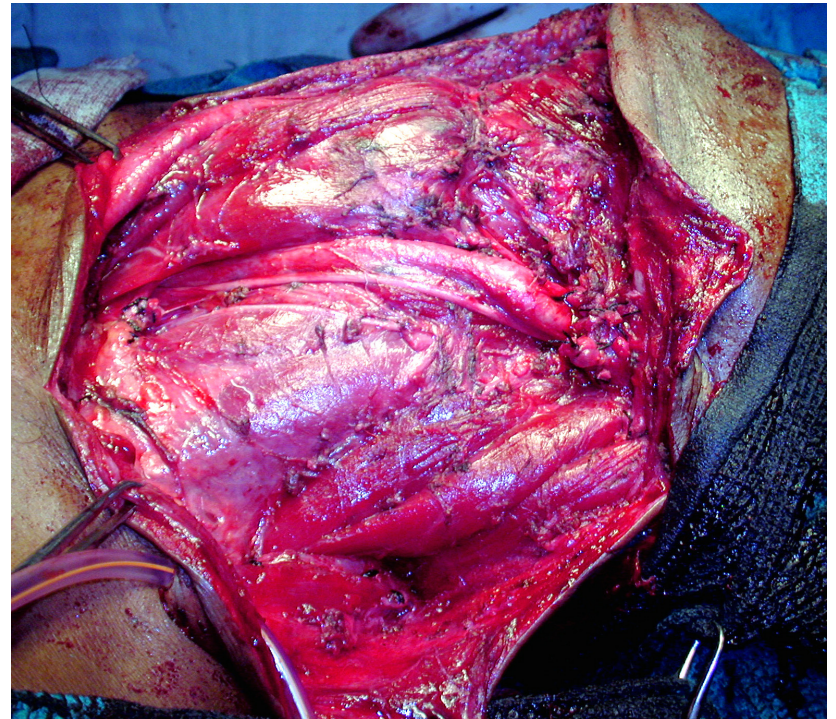
RADICAL NECK DISSECTION

■ Boundaries

- Anterior –
lat border of strap muscles &
opposite ant belly of digastric
- Posterior –
anterior border of trapezius
- Inferior – clavicle
- Superior - mandible

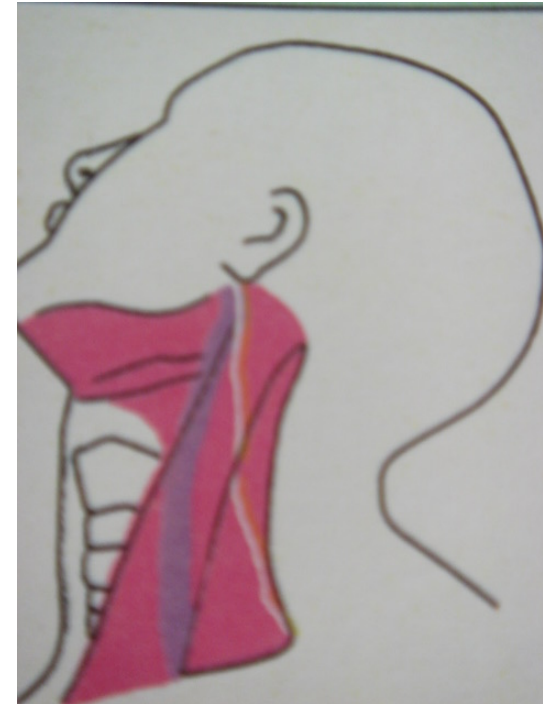
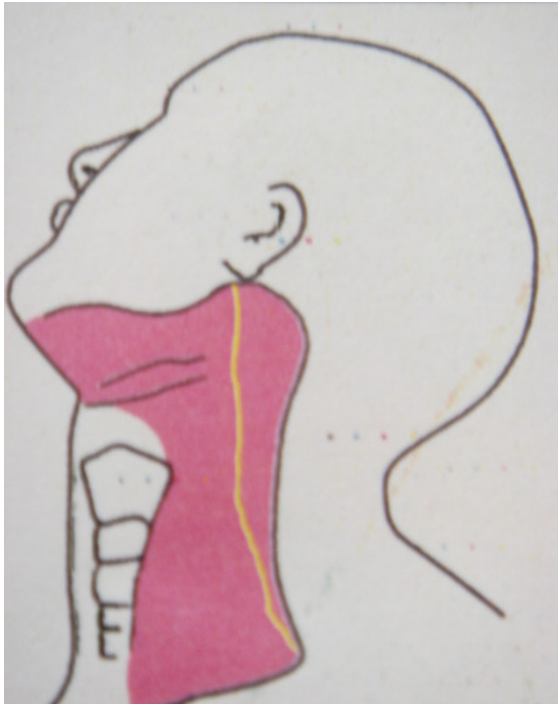


RADICAL NECK DISSECTION



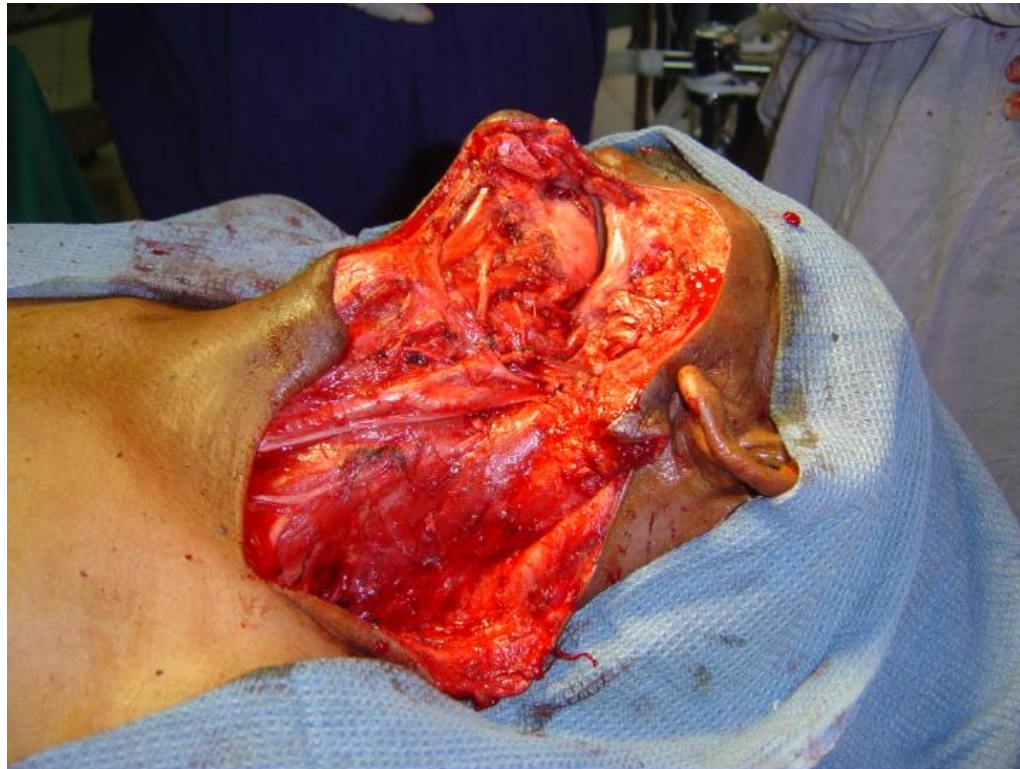
MODIFIED RADICAL NECK DISSECTION

- Type I spinal accessory nerve
- Type II Spinal accessory nerve and Sternomastoid
- Type III SAN, SCM, IJV



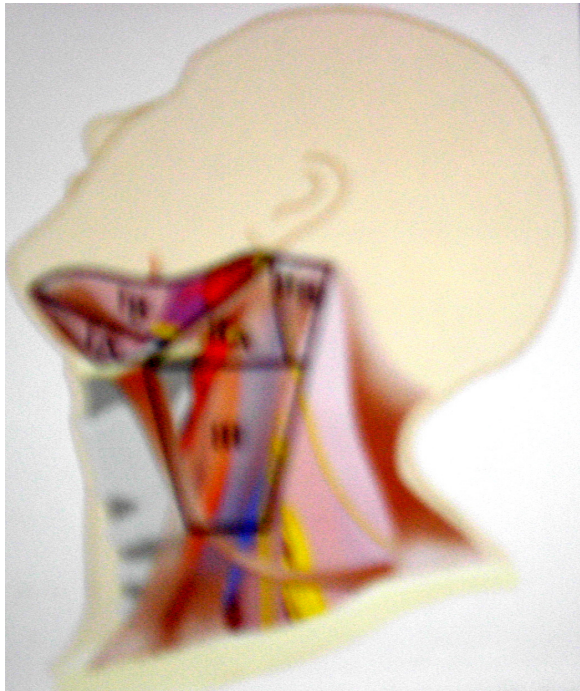
EXTENDED RADICAL NECK DISSECTION

- RND + extranodal station & non nodal structure



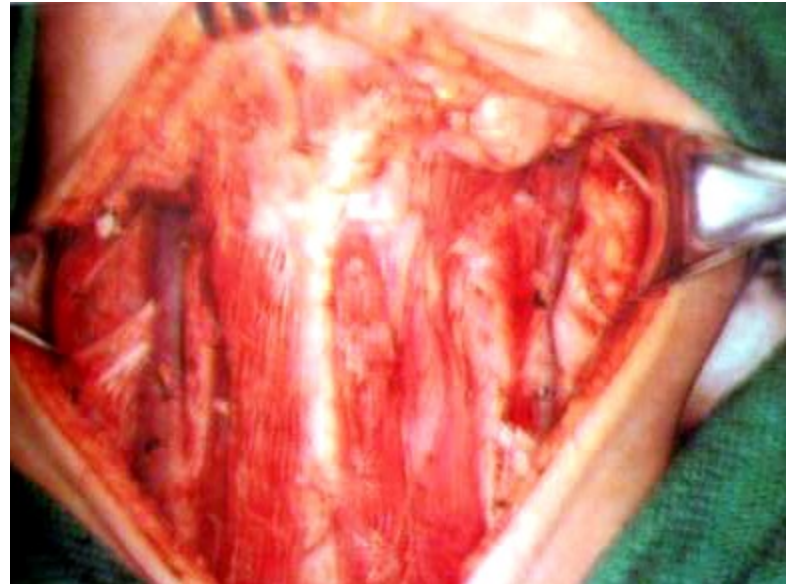
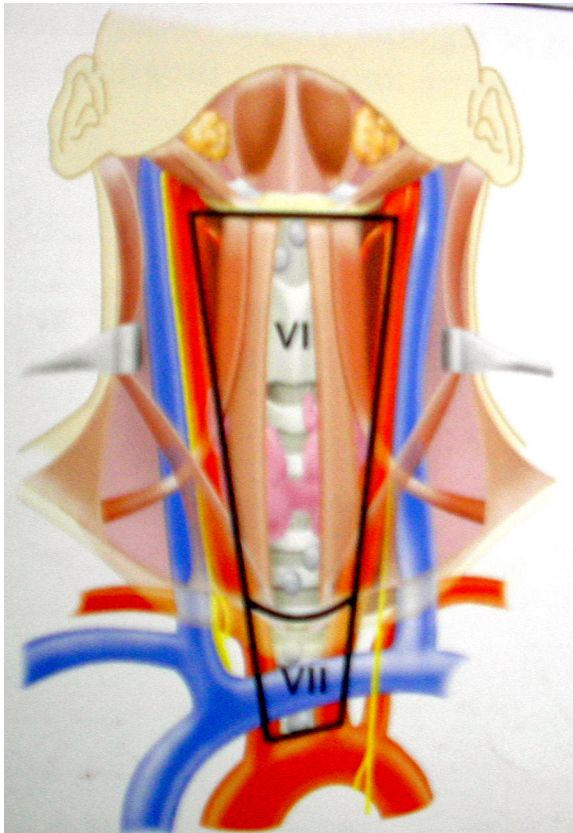
SELECTIVE NECK DISSECTION

SUPRAOMOHYOID NECK DISSECTION



SELECTIVE NECK DISSECTION

Central neck dissection



SURGICAL ANATOMY IN NECK DISSECTION



- **Spinal accessory nerve – landmark**
 - It enters into posterior triangle at the junction of upper 1/3 & lower 2/3 of posterior border of SCM – Erb point
 - It leaves deep to trapezius
- **Marginal mandibular nerve – landmark**
 - passes superficial to fascial vessel hence flap to be raised deep to it.
- **Internal jugular vein – site of ligation**
 - Lower - Deep to inferior omohyoid muscles
 - Upper – Deep to Post belly of digastric muscle

NERVE INJURY

Marginal mandibular nerve



Spinal accessory nerve



A photograph of two pink flamingos in a pond. The flamingo in the foreground is wearing a black high-heeled shoe on its right foot. The background is dark and out of focus, showing some greenery.

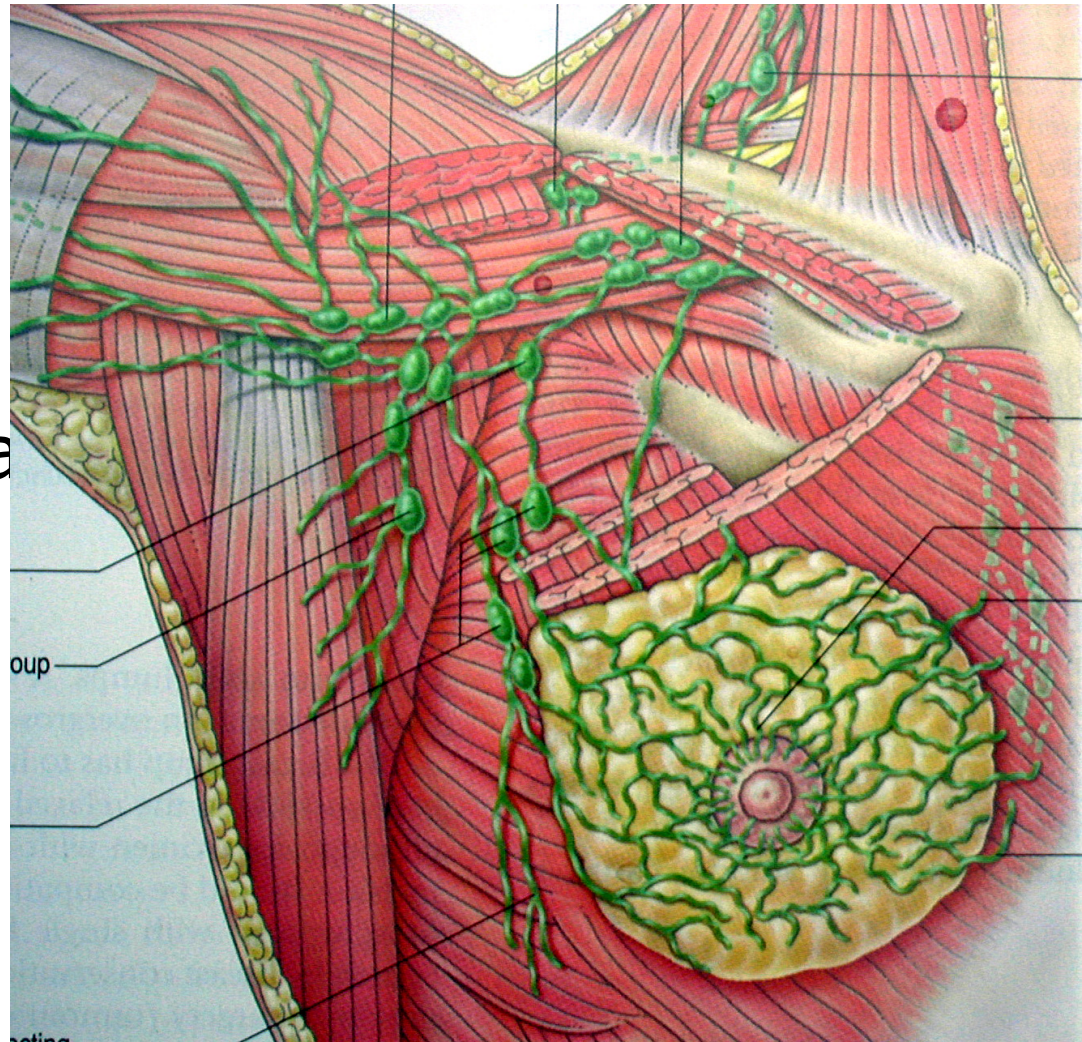
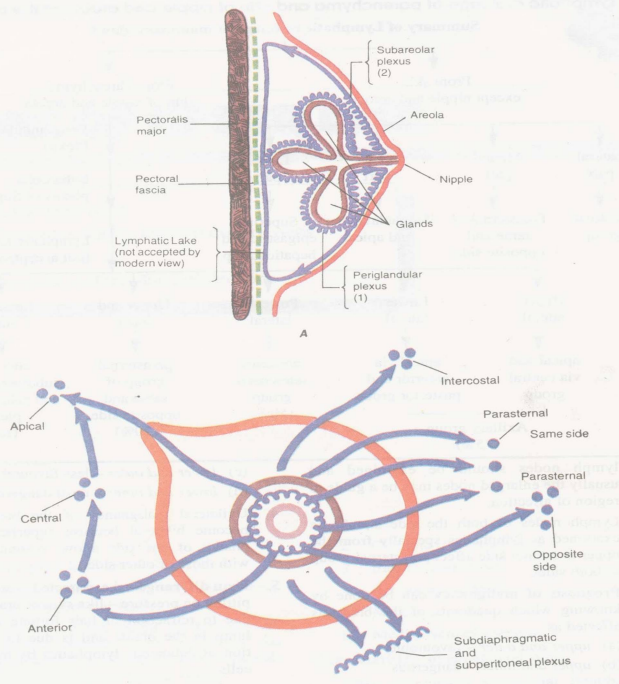
AXILLARY REGIN

*The most poisonous three-letter
word.....*

"EGO"

Kill it.

BREAST



- 75% of lymphatic drainage is to the axilla
- Remaining lymphatics drain to internal mammary & other nodes

LEVELS OF AXILLARY NODES

Anatomist : 6 groups

Oncologist : 3 groups

LEVEL 1 NODES:

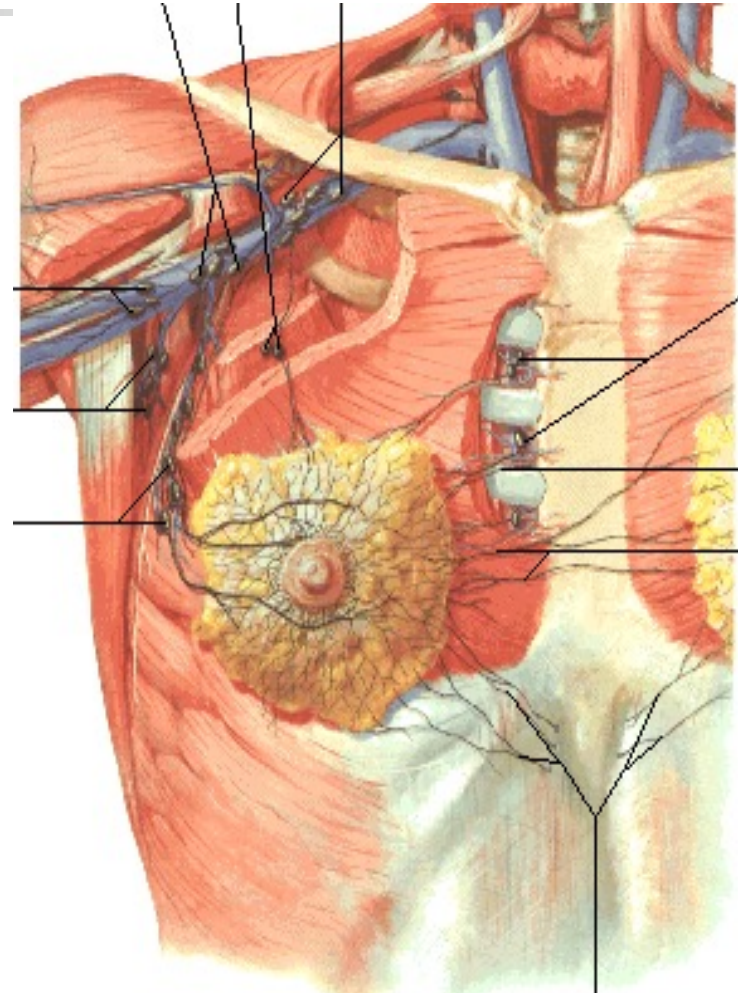
lateral to the lateral border of pectoralis minor muscle

LEVEL 2 NODES:

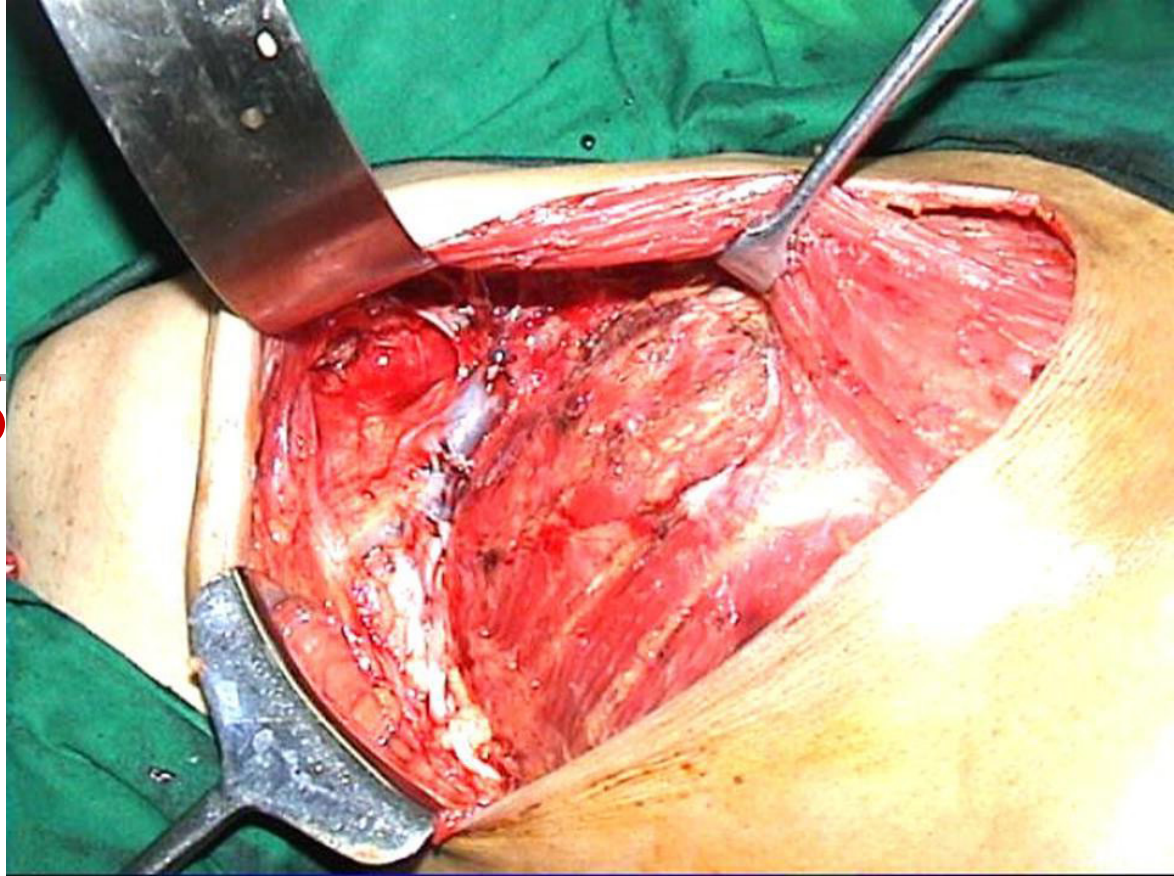
under the pectoralis minor muscle

LEVEL 3 NODES:

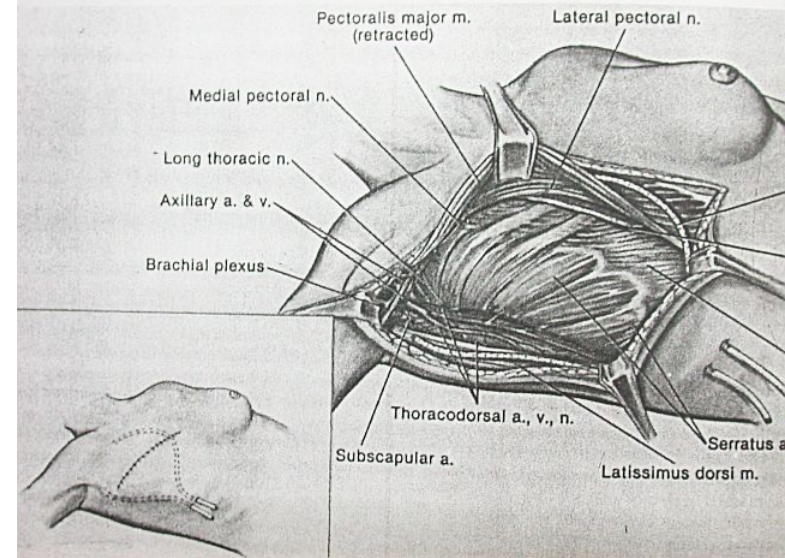
medial border of pectoralis minor and first rib



AXILLARY DISSECTION BOUNDARIES



- Superior – axillary vein
- Medial – apex-costoclavicular lig
- Lateral – thoracodorsal vessels
- Inferior – angular vein
- Posterior – subscapularis muscle
- Anterior – pectoralis major muscle



SURGICAL ANATOMY IN MRM



- Flap thickness – 6 to 8mm
- Since pectoral fascia is tough barrier to tumor invasion breast to be excised along with the pectoral fascia
- Lateral thoracic artery accompanies nerve to serratus anterior
- Thoracodorsal vessel accompanies nerve to latissimus dorsi

ILIOINGUINAL REGIN

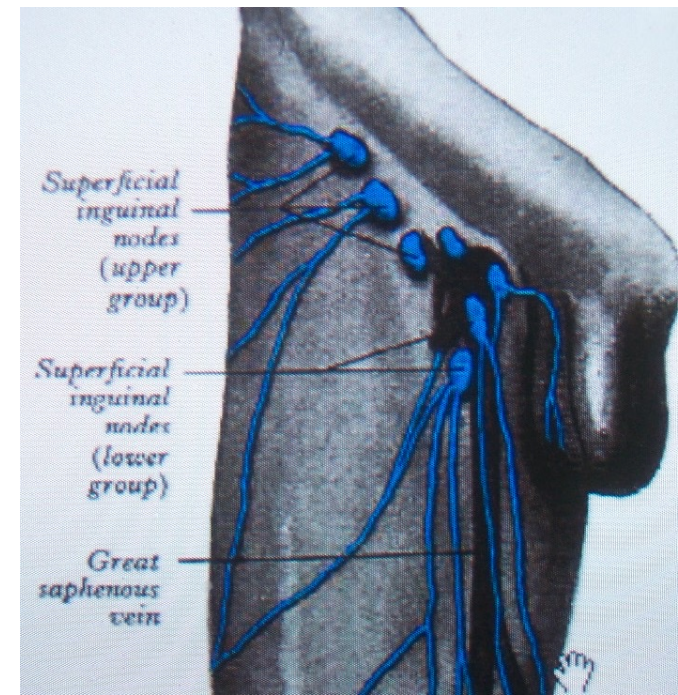
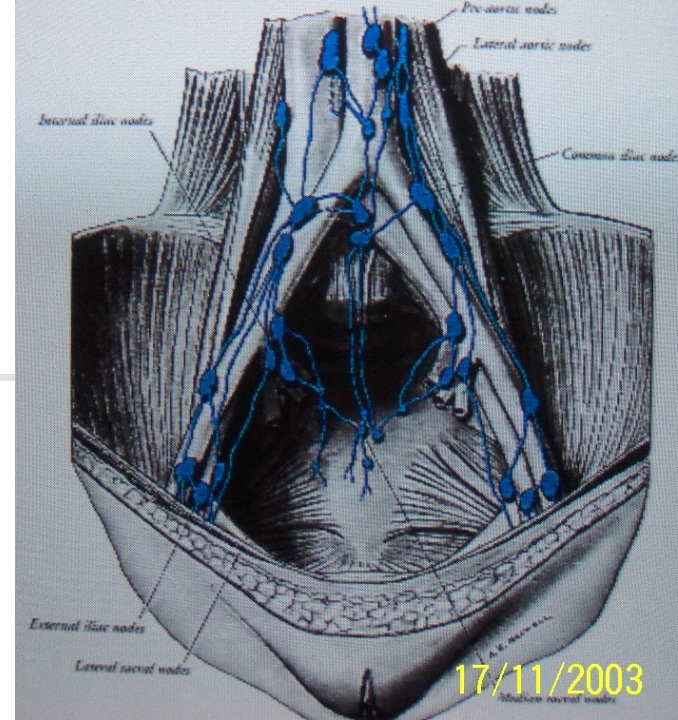
**THE MOST USED FOUR-LETTER
WORD.....**

"LOVE"

Value it.

LYMPHATIC DRAINAGE OF PENIS

- Penis & Glans – Superomedial, inferomedial and central zones of inguinal nodes
- Penile skin – Superolateral
- External iliac nodes receive drainage from deep inguinal,
- External iliac nodes drain into the common iliac nodes



ILLIOINGUINAL DISSECTION



- Superficial inguinal dissection
- Inguinal dissection
- Comprehensive ilioinguinal block dissection

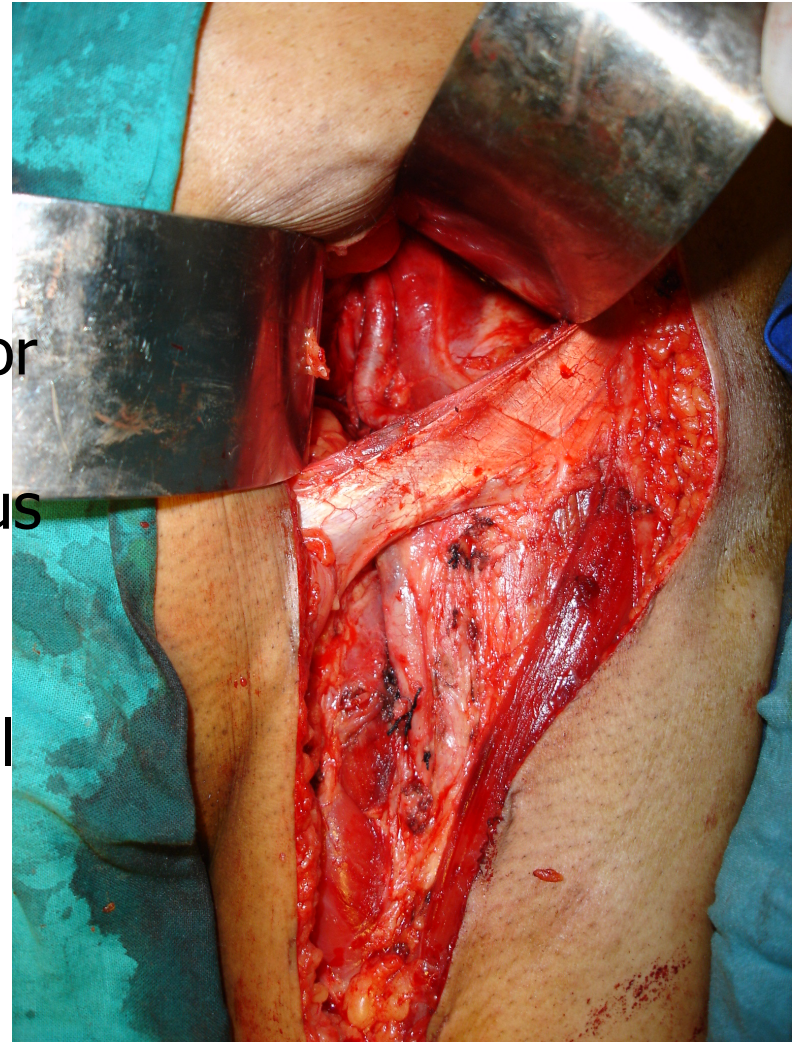
SUPERFICIAL BLOCK DISSECTION

- Dissection of the superficial nodes
Superficial to femoral vessels

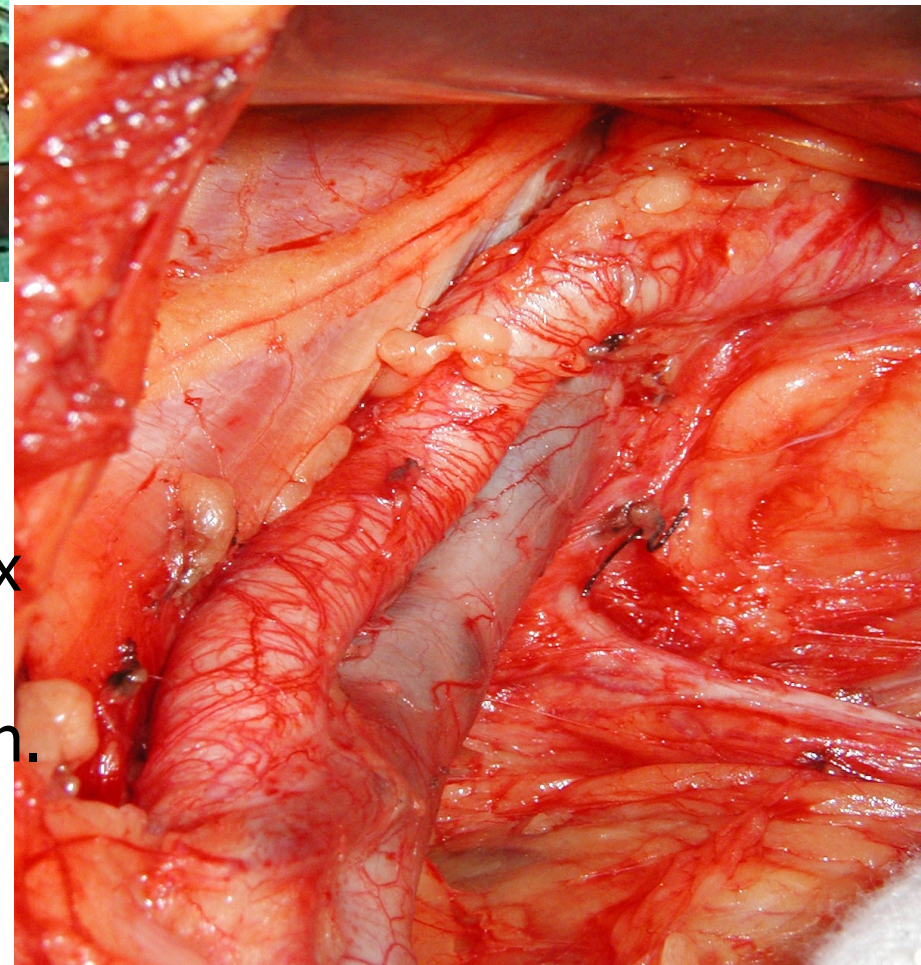
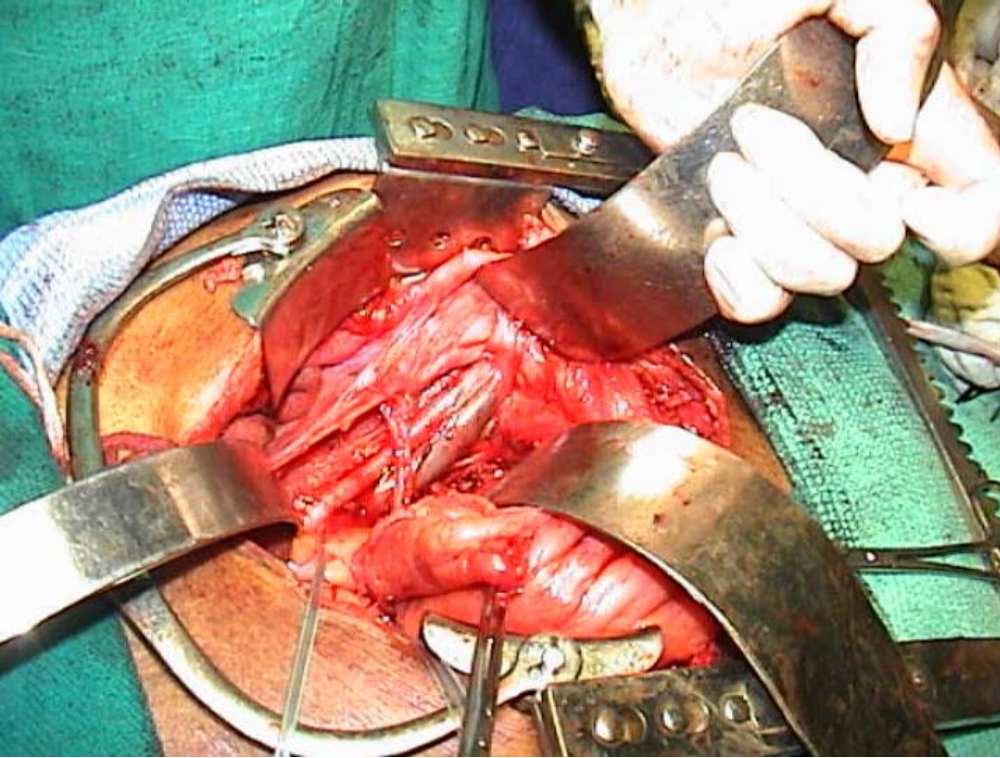


INGUINAL BLOCK DISSECTION

- Removal of the superficial, deep group of lymph nodes
- Boundaries:
 - Medial – medial border of adductor longus
 - Lateral – medial border of sartorius
 - Inferior – apex of the above two muscles
 - Superior – 1cm above the inguinal ligament



ILLIAC DISSECTION



- Superiorly -upto bifurcation of com. iliac vessels
- Inferiorly -upto deep circumflex iliac vein
- Laterally -upto genitofemoral n.
- Medially -upto obturator n.



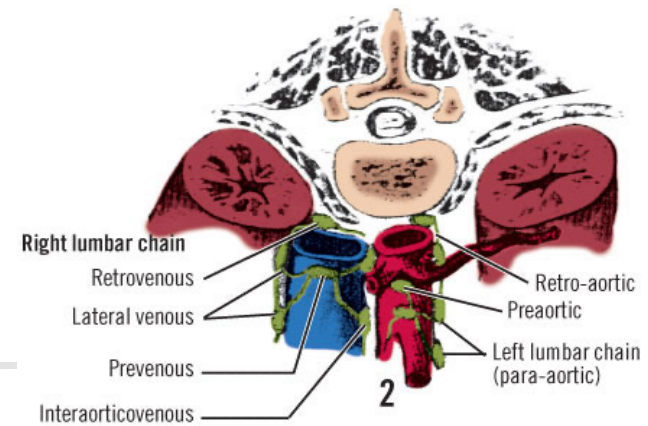
RETRO PERITONEAL
LN REGIN

***THE MOST PLEASING FIVE-LETTER
WORD.....***

"SMILE"

Keep it.

RETRO PERITONEAL L.N

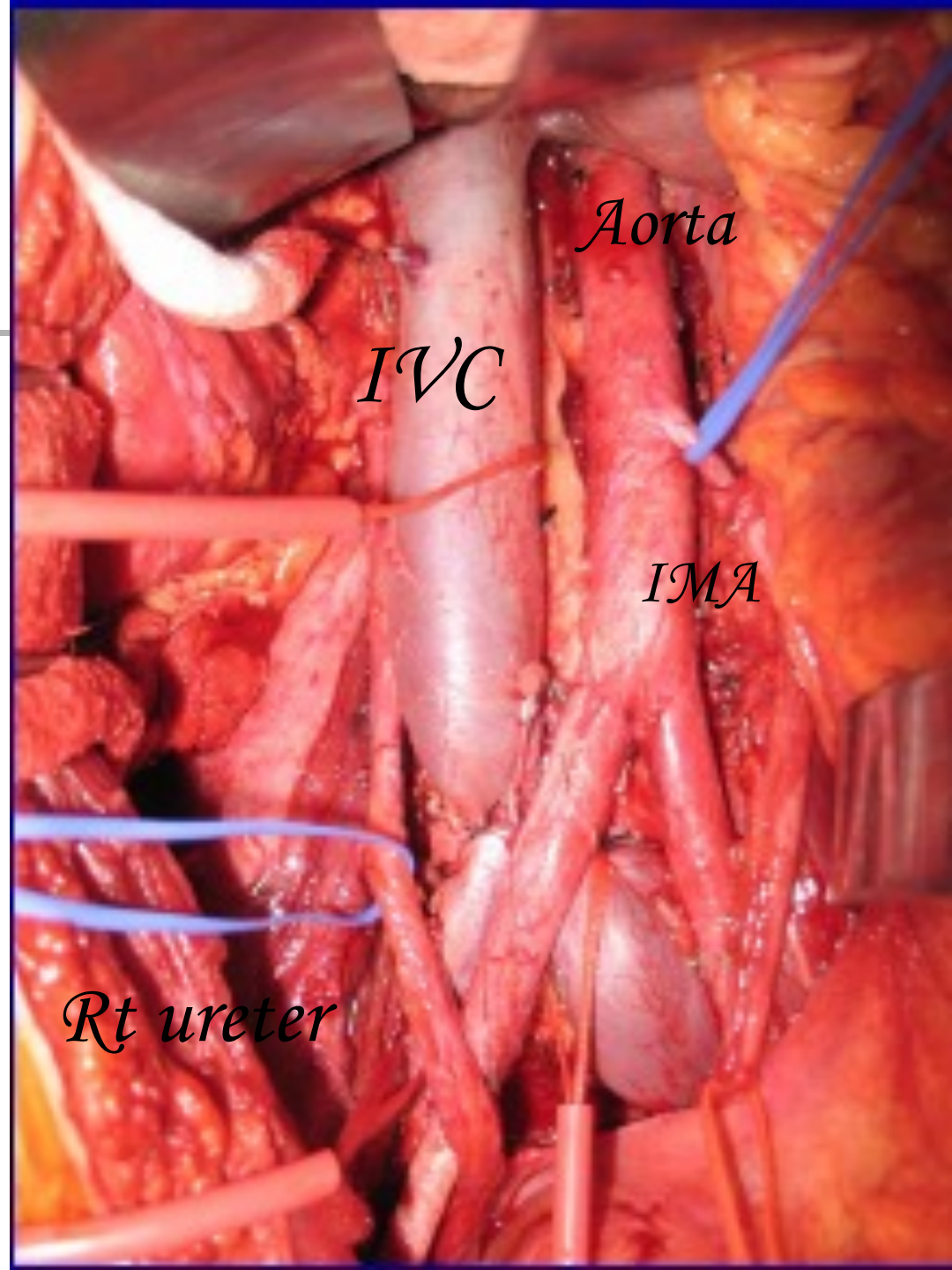
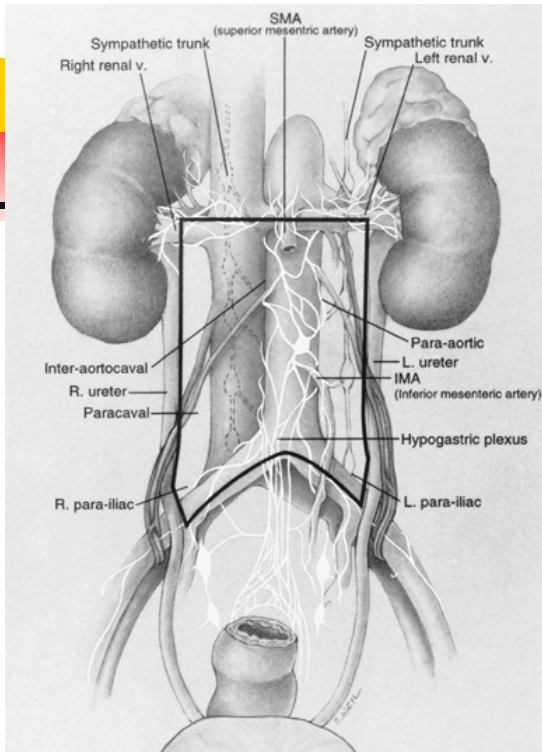


Copyright ©2006 by The McGraw-Hill Companies, Inc.
All rights reserved.



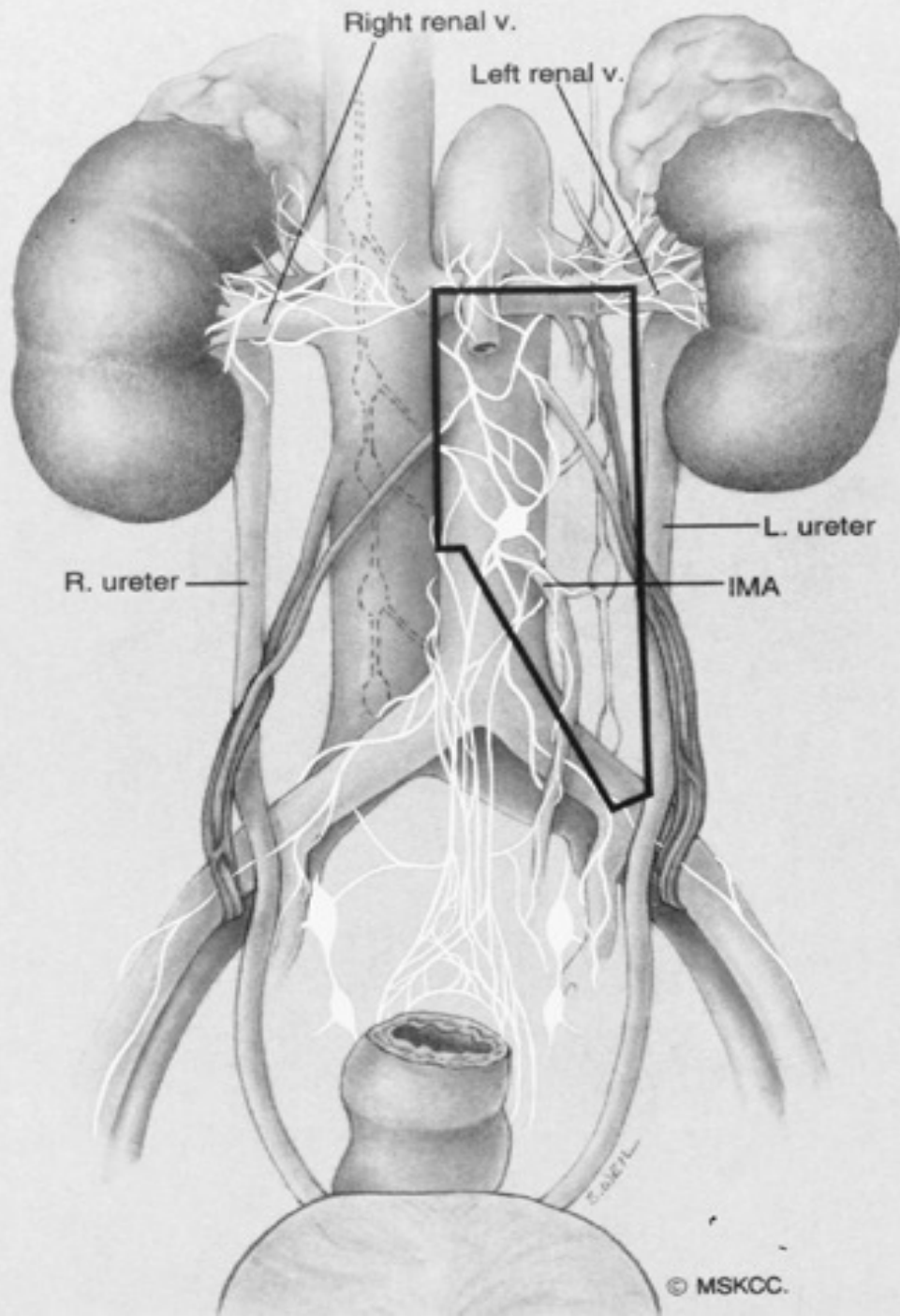
- Precaval
- Paracaval
- Interaortocaval
- Preaortic
- Paraaortic
- Common iliac nodes bilaterally

RPLND

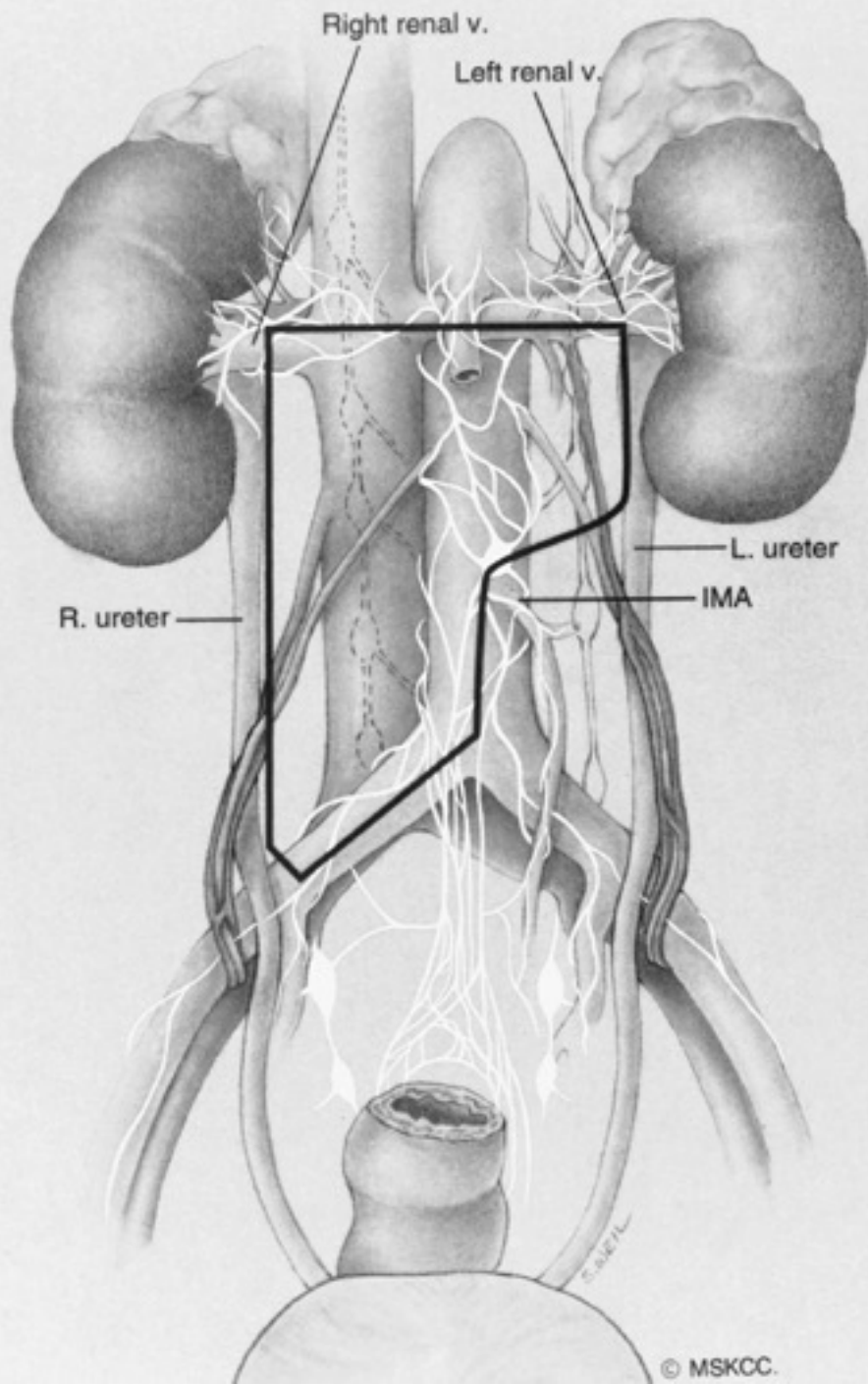


■ BOUNDARIES:

- Superior – renal pelvis
- Lateral – both ureter
- Inferior – bifurcation of aorta



**MODIFIED NERVE AVOIDING
TEMPLATE FOR
LEFT TESTICULAR TUMOR**



**MODIFIED NERVE AVOIDING
TEMPLATE FOR RIGHT
TESTICULAR TUMOR**

G.I.T TRACT



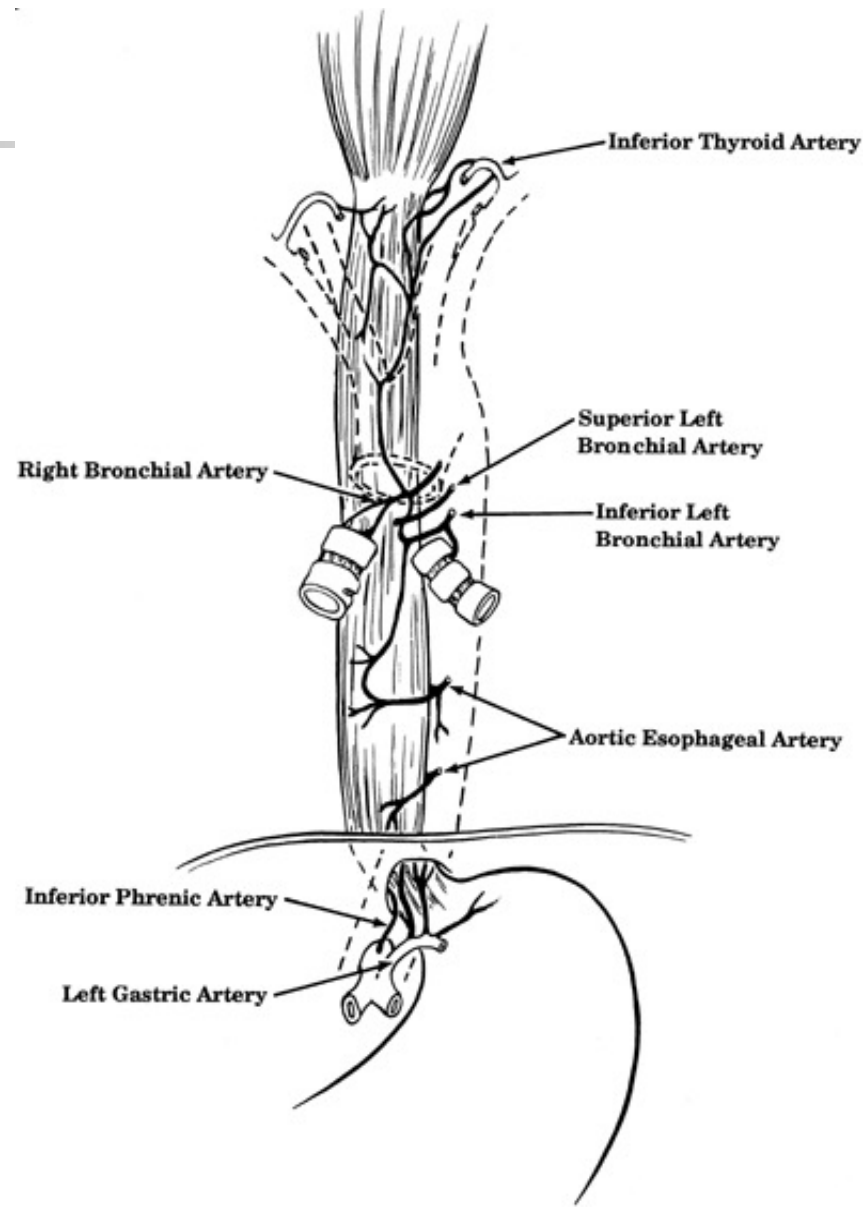
***THE FASTEST SPREADING SIX-
LETTER WORD...***

"RUMOUR"

Ignore it.

ESOPHAGUS

- 40 % of middle third and 20 % of lower third cancers have metastases in neck nodes
- 20 % of upper third cancers have metastases in celiac nodes





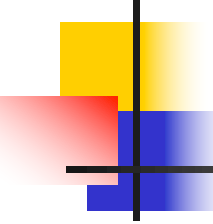
ONCOLOGICAL APPLICATION

THREE FIELD LYMPHADENECTOMY

BASIS – skip metastases

- -Isonomy et al.

Stomach

- 
1. Rt. cardiac node
 2. Lt. cardiac node
 3. Lesser curvature node
 4. Greater curvature node
 5. Supra pyloric node
 6. Infra pyloric node

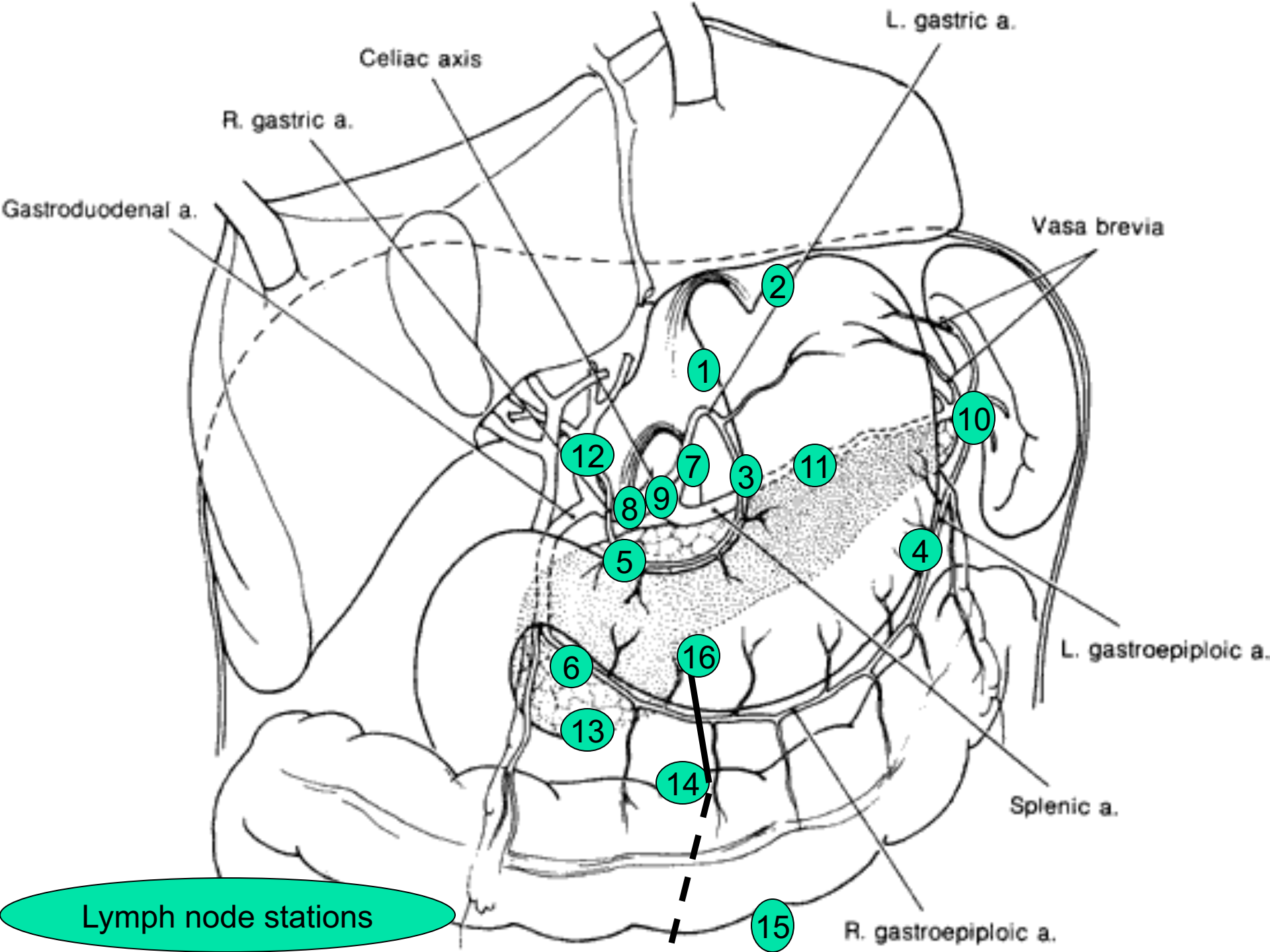
N1 NODES
Along the
Curvatures

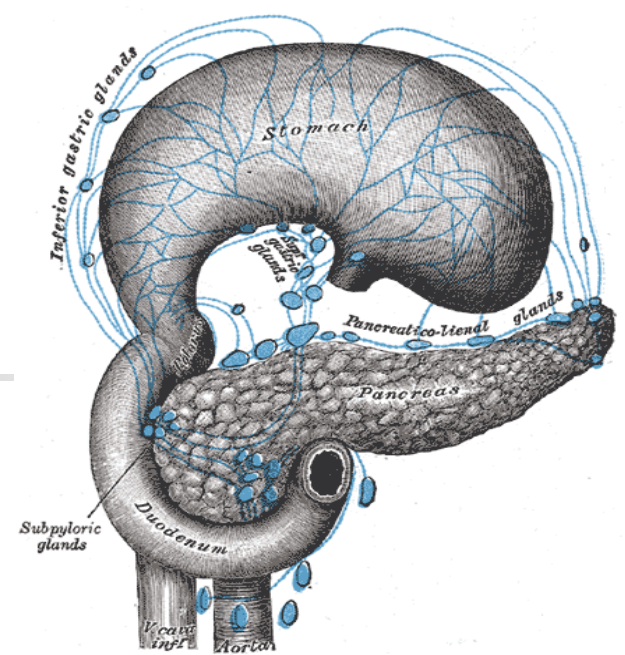
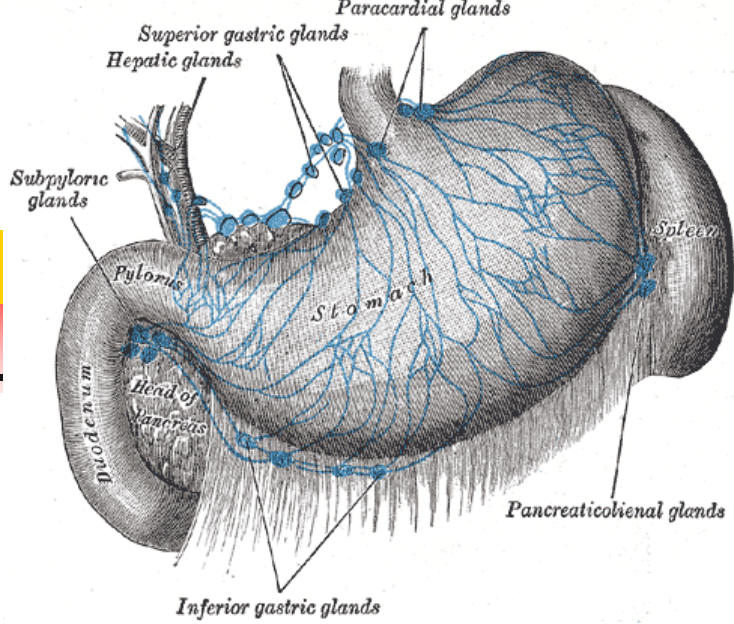
7. Lt. Gastric node
8. Common hepatic node
9. Celiac node
10. Splenic hilar node
11. Splenic A. node

N2 NODES
Along the
Named vessels

12. Hepato duodenal lig. node
13. Retro pancreatic node
14. Root of mesentery node
15. Middle colic node
16. Para aortic node

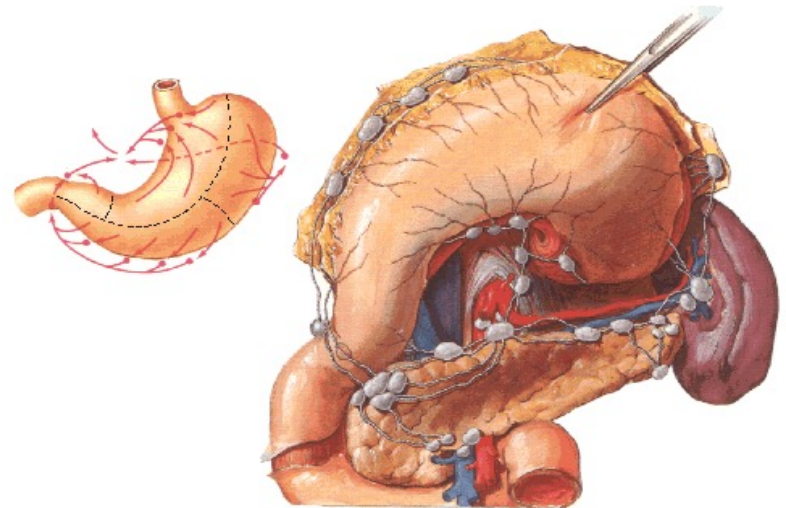
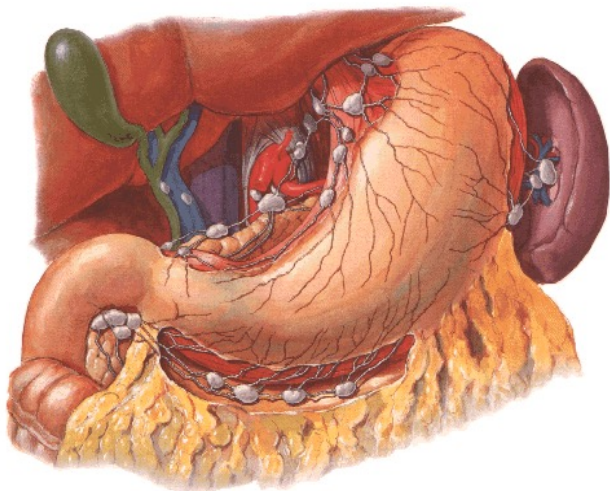
N3 NODES
Intraperitoneal
Nodes





ANTERIOR VIEW

POSTERIOR VIEW



LYMPHATICS



- Sub mucous lymphatics
 - Spread to Esophagus
- Sub serous lymphatics
 - Spread to Duodenum
- Extraperitoneal parts of stomach
 - Drains directly to para aortic nodes

No lymphoid tissue in Gastric mucosa, But most common site for Lymphomas of GI tract

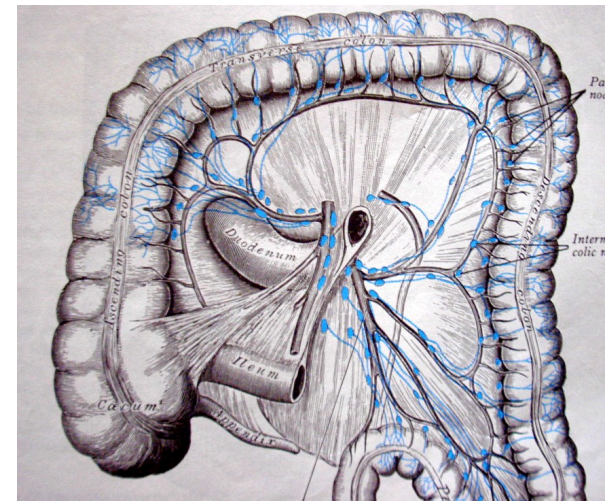
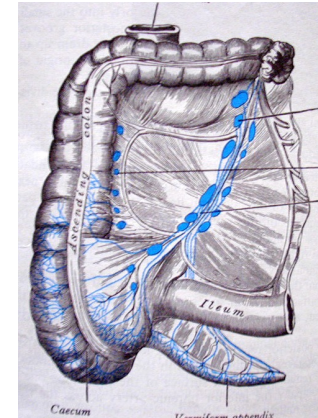
COLON LYMPHATIC DRAINAGE

First tier -Epicolic nodes
adjacent to colon

Second tier – Para colic
along the marginal vessels

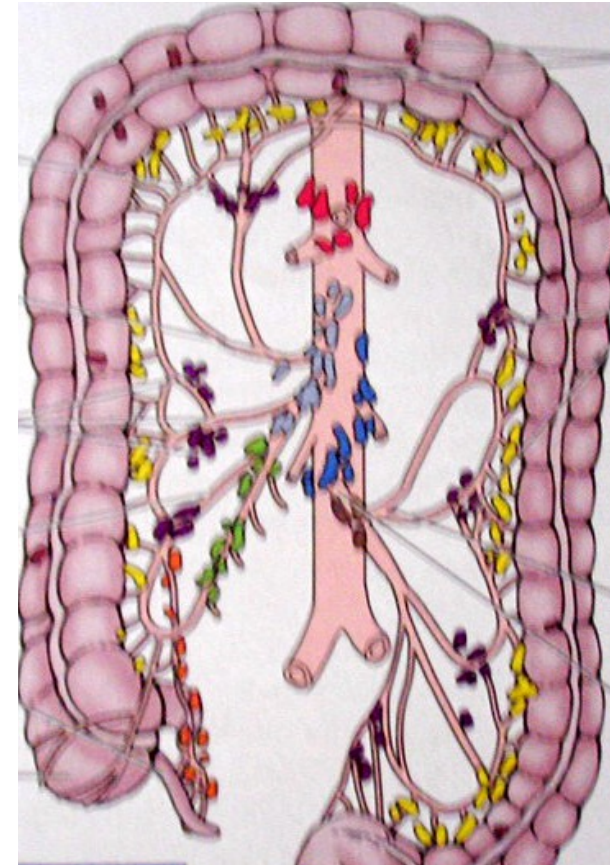
Third tier – intermediate nodes
along the named branch

Fourth tier – Principle node
along the S.M.A, I.M.A



COLON EXTENT OF RESECTION

- 5cm. of normal bowel proximal and distal to the tumor
- Determined by the blood vessels that must be divided to remove the lymphatic drainage of the tumor bearing portion of the colon with tumor free margins



LYMPHATIC DRAINAGE-RECTUM



- The majority of the L.D of the rectum passes upwards along the S.R.A towards I.M.A
- The part of the rectum , 4-8 cm from anal verge drains laterally along M.R.A to the iliac nodes

A herd of zebras is shown from a side profile, drinking water from a river. The zebras are in a line, with their heads lowered into the water. The background is a soft-focus natural setting.

REGIONAL VS METASTASIS

***THE HARDEST WORKING SEVEN-
LETTER WORD..***

"SUCCESS"

Achieve it.



REGIONAL Vs METASTASIS

- In carcinoma lymph nodal involvement is a regional disease in principle lymphatic basin
- When the spread is beyond, it is considered as metastatic disease
- In sarcoma it is always metastasis



REGIONAL VS METASTASIS

- HEAD & NECK:

- Level VII superior mediastinal node is a metastatic node in all head & neck malignancy except in thyroid where it is a regional node

- BREAST:

- Neck nodes below the cricoid (supraclavicular node) is a regional disease(N_{3c}) other nodes are metastatic

REGIONAL VS METASTASIS

- GIT:
 - Esophagus - Celiac/Supraclavicular node
 - Stomach - N3 nodes
 - Pancreas - Celiac nodes
 - Colon - S.M.A / I.M.A nodes
 - Rectum - Common iliac nodes



REGIONAL VS METASTASIS

In stomach N1, N2 nodes are Regional nodes and N3 nodes are Metastasis

Involvement of N3 nodes is a contraindication for radical surgery

In colo-rectal cancer, chance of cure is high after radical surgery when nodal disease is limited to intermediate nodes – regional
But if principle nodes are involved it is incurable-metastatic

In anterior resection –

Clearance of the nodes below the left colic artery is enough

Clearance of I.M.A nodes is optional

REGIONAL VS METASTASIS

INGUINAL NODE IN TESTICULAR TUMOUR

METASTASIS

Retrograde lymphatic spread

Circulating cells

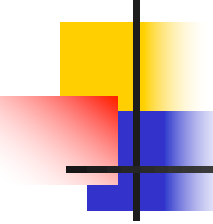
NO VIOLATION

Regional node

Alters the lymphatic pathway

AFTER VIOLATION

ONCOLOGICAL APPLICATION



Consequences of Scrotal violation interpretation of nodal staging

- In testicular cancer, involvement of pelvic and inguinal node is a metastatic disease and not a regional disease
- In scrotal violation ,due to alteration of lymphatic pathway these nodes are involved
- involvement of this node to be considered as regional disease

REGIONAL VS METASTASIS

GYNAC CANCER:

Regional

metastatic

cervix	Pelvic node	Paraaortic inguinal
Endometrium	Pelvic Paraaortic	Inguinal
Ovary	Pelvic Paraaortic inguinal	
vulva	Inguinal	pelvic

ADEQUATE LYMPHADENECTOMY

A polar bear is shown in profile, walking from left to right across a snowy, uneven terrain. The bear's fur is a mix of white and light brown. The background is a dark, blueish-grey, suggesting a cloudy sky or a dark background.

*THE MOST ENVIABLE EIGHT-
LETTER WORD....*

"JEALOUSY"

Distance it.

ADEQUATE LYMPHADENECTOMY HOW MANY NODES?

- Esophagus - 25 nodes
- Stomach - 15 nodes
- Hepatobiliary - 3 nodes
- Pancreas - 10 nodes
- Colon - 12-15 nodes

ADEQUATE LYMPHADENECTOMY HOW MANY NODES?

- Head & Neck :
 - RND - 10 nodes
 - SND - 6 nodes
 - Thyroid - 6 nodes
- Breast - 6-10 nodes
- Pelvic dissection - 6 nodes



*THE MOST POWERFUL NINE-
LETTER WORD....*

"KNOWLEDGE"

ACQUIRE IT.

*THE MOST ESSENTIAL TEN-LETTER
WORD....*

"CONFIDENCE"

Trust it.



THANK



YOU