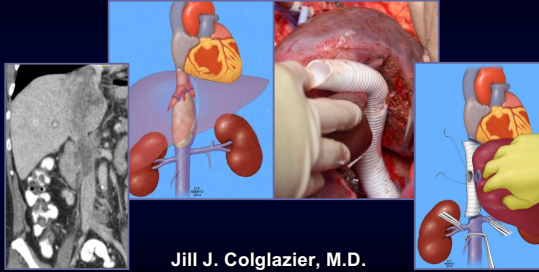


Tips & Tricks for Optimal Management of Primary and Secondary IVC Tumors



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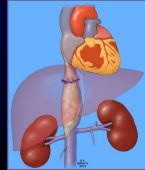
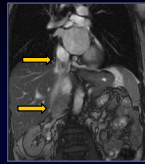


I have no relevant financial relationships to disclose at this time



Primary Venous Leiomyosarcoma

- Only 2% of all leiomyosarcomas
- Involves suprarenal IVC in over 40%*
- More common in women, occur at mean age of 50-60 years
- Abdominal pain most common symptom (66-96%)
- Distant metastases in 50% (lung, liver)



*Mingoli, et al. J Vasc Surg 1991
Wachtel, et al. Surg Oncol 2015



Secondary Tumors of the IVC

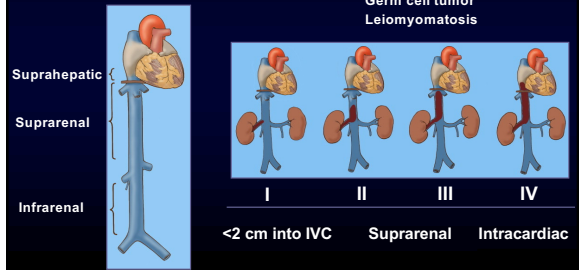
Retroperitoneal sarcoma

Liver cancer

Pancreaticoduodenal cancers

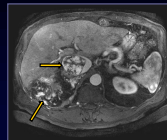
Intraluminal Thrombus

Renal cell cancers
Adrenocortical cancers
Pheochromocytoma
Germ cell tumor
Leiomyomatosis

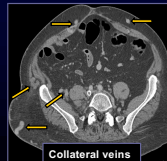


Principles of Management

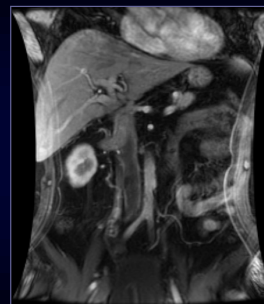
- Assess patient performance status, comorbidities, and need for adjuvant therapy
- Define type and extent of tumor
- Distant metastases
- Degree of venous obstruction and definition of collateral veins
- TEE, DSE & PFT's
- Multidisciplinary team



Imaging



Predictors of IVC Wall Invasion

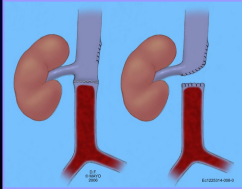


- Abnormal gadolinium signal on either side of caval wall
- IVC diameter of 40-mm or more
- Tumor thrombus located at level III or IV
- Renal vein orifice dilated to 14 mm or more



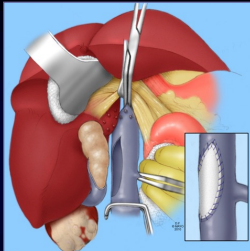
Our Approach

- The infrarenal IVC can be resected without replacement if chronically occluded



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Vena Cava Patch



IVC defect, such as seen after removal of renal cell tumor thrombus

Diameter of patch needed is often underestimated

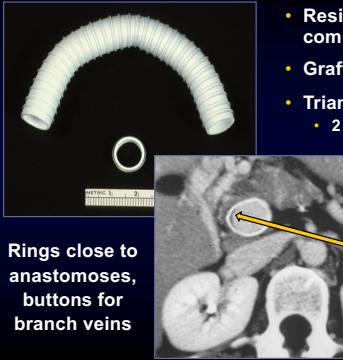
$D \times 3 \times \% \text{ of caval wall to be replaced}$

Patch

Will patch up to 60% of a caval defect

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Externally-supported PTFE Graft



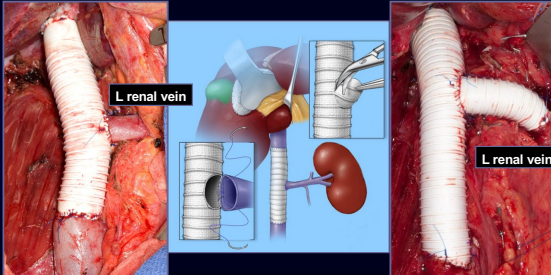
- Resists visceral compression
- Graft diameters 16-20 mm
- Triangulate suture line
 - 2 double armed 3-0 Prolene

Rings close to anastomoses, buttons for branch veins

Often develop small layer of pseudo intima or thrombus

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Renal Vein Reconstruction



L renal vein

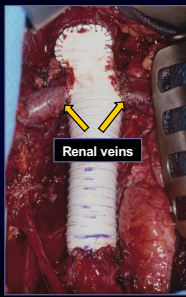
Re-implantation Vein cuff

Circular button cut out of graft

10-14 mm graft

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Renal Vein Reconstruction



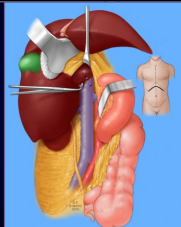
Renal veins

- Routine re-implantation of LRV
- RRV re-implanted first due to lack of collateral drainage
- Control renal arteries to prevent organ congestion
- Preserve rings at graft openings

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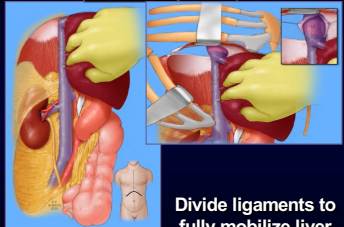
Right Medial Visceral Rotation to Expose Suprarenal IVC

Anterior approach



Ligate and divide caudate lobe veins

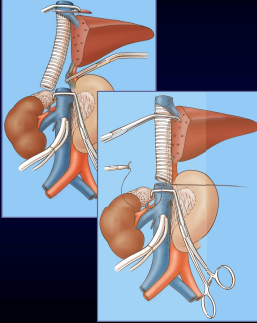
Retrohepatic



Divide ligaments to fully mobilize liver

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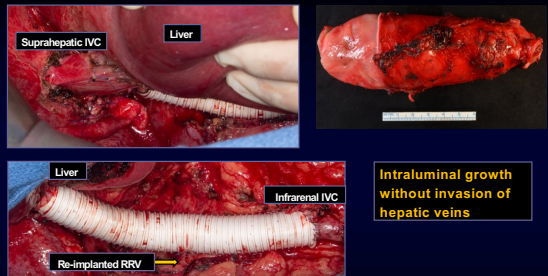
Retrohepatic IVC Replacement Using Total Vascular Isolation of Liver



- **Secure place** for supra-hepatic clamp
- **Test clamp** of the supra-hepatic IVC to determine hemodynamic response
- **Transfer clamp to graft** after washout of acid metabolites from liver
- **Graft cut to length** after max. inhalation/exhalation
- **Ischemic preconditioning**

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Retrohepatic and Pararenal IVC Replacement

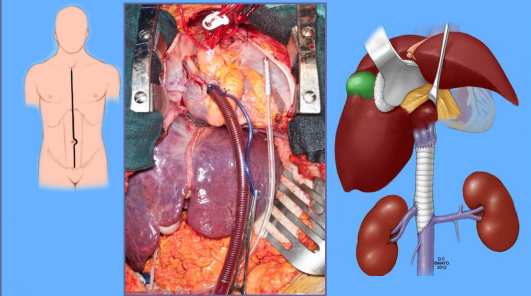


- Suprahepatic IVC clamping
- Veno-venous bypass
- Control of the portal triad

Intraluminal growth without invasion of hepatic veins

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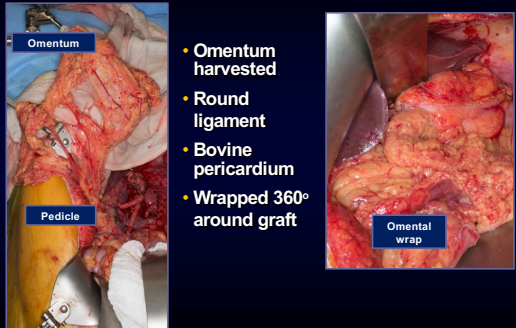
Cardiopulmonary Bypass



Intra-atrial IVC thrombus or Liver congestion

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Conduit Coverage



- Omentum harvested
- Round ligament
- Bovine pericardium
- Wrapped 360° around graft

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Summary

- **Primary and secondary malignancies of the inferior vena cava can be safely resected in select patients**
- Keys to success are patient selection, the right surgical and oncologic team, and meticulous operative preparation and execution
- **Surgery provides best chance for survival**

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