

A stylized, light-colored illustration of a plant with a central stem, several large leaves, and a cluster of small, round buds or flowers at the top, set against a dark brown background on the left side of the slide.

MULTIMODAL LIVER DIRECTED MANAGEMENT OF NEUROENDOCRINE HEPATIC METASTASES

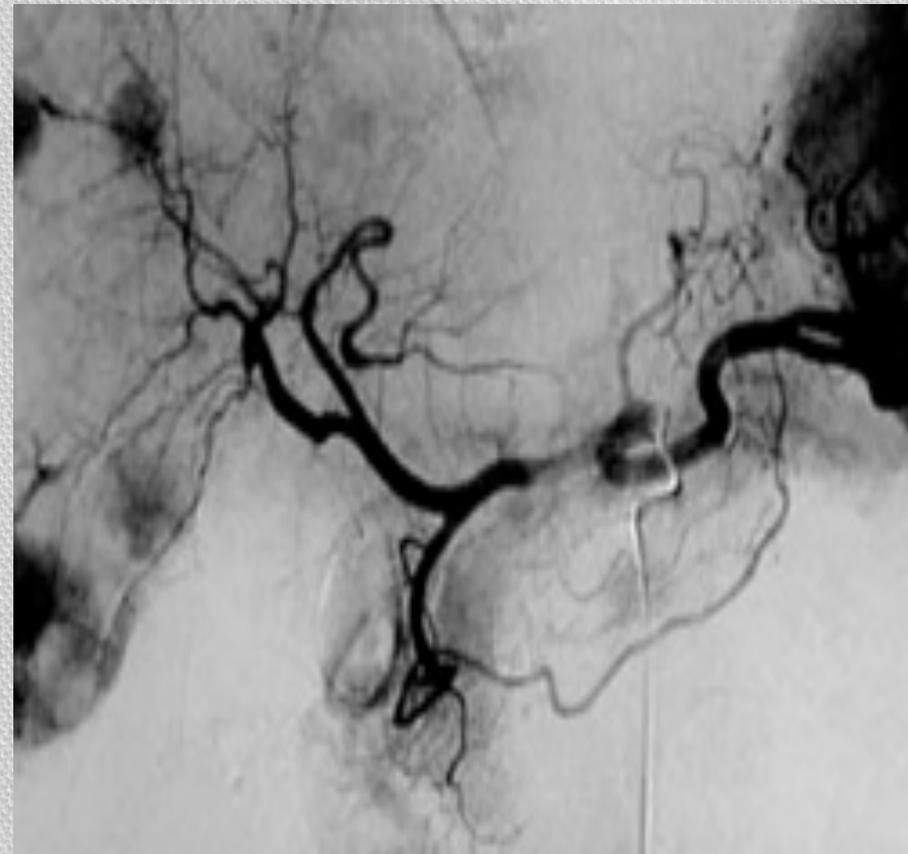
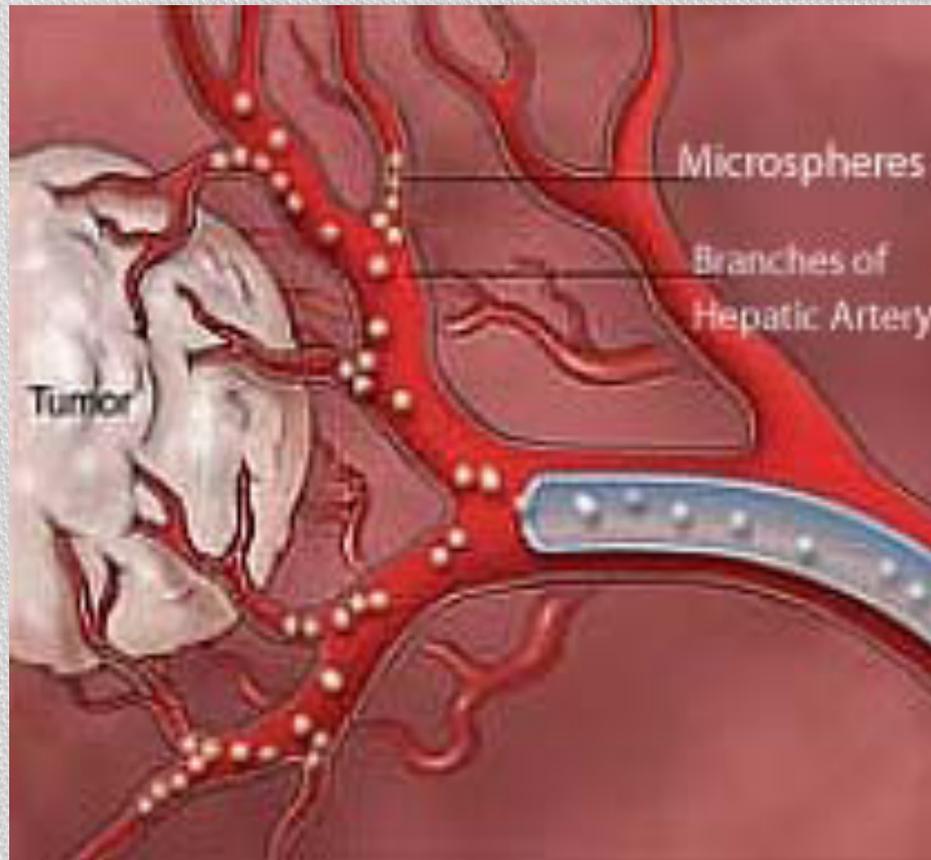
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No Conflicts



Neuroendocrine Tumors (NETs) Management

- Increasing in prevalence
- Liver involvement often represents greatest thread of morbidity and mortality with this malignancy. 40% can present with metastases at time of diagnosis.
- Lesions can compromise liver function and secretory peptides which would normally be inactivated by the enterohepatic (liver) circulation (in mid gut primaries) can release vasoactive amines into the systemic blood stream resulting in **carcinoid syndrome: flushing, diarrhea, wheezing, shortness of breath, rapid heart rate, drop in blood pressure and thickening of heart valves**

Treatment Options

- Medical
- Surgical resection
- **Hepatic Artery Embolization and Chemoembolization**
- Radioembolization
- **Focal Ablation**
- Liver Transplantation



HEPATIC ARTERY BLAND EMBOLIZATION

- Liver cells have a dual blood supply. Portal vein (approximately 80%) and hepatic artery (approximately 20%) supply the liver cells.
- Bile ducts are only supplied by the hepatic artery.
- Malignant tumors of all types have only arterial blood supply.
- We use the liver's vascular duality and the fact that cancer recruits arteries to grow to embolize the terminal arterial branches and prune the blood supply to the tumors.
- We can use tiny particles alone (transarterial embolization or bland embolization) or we can use chemotherapy (with or without particles, transarterial chemoembolization or TACE)
- Transarterial Embolization with drugs has been used for 20 years
- It has best results in patients who are nonsurgical with progressive disease, refractory symptoms despite optimal medical therapy, less than 60% liver involvement (can treat high volume disease but need to go slowly) and have good functional status.
- We often follow urinary 5HIAA and chromogranin A to evaluate response

TACE /TAE FOR NET

Literature has not consistently shown a clear benefit of TACE (chemo drugs) over TAE. No randomized head to head studies have been performed.

- Small select studies have suggested a trend to a slightly longer progression free survival in chemotherapy arm while others have found no difference in efficacy between TAE and TACE.
- We have no consensus on the most efficacious chemotherapeutic agent. Doxorubicin, mitomycin C, streptozocin, vinblastine, gemcitabine, 5 FU and cisplatin have all been used.
- Most common regimen is a 3 drug combination of doxorubicin (20-30 mg), cisplatin (50 mg) and mitomycin (10-30 mg) mixed with 10 cc of lipiodol.
- Another regimen uses particles loaded with doxorubicin and this slowly elutes into the liver over about 2 weeks (slow release). This is called drug eluting beads or DEB TACE.
- TAE or bland embolization is done with a myriad of embolics both PVA and spherical agents. Most commonly used are the spherical agents.
- Requires 1-2 nights in hospital often with IV octreotide to prevent a carcinoid crisis from release of large loads of vasoactive peptides into the blood stream from dying tumor

Biochemical markers

- There is a relationship between biochemical markers and survival post embolization
- Patients who had a greater than 50% reduction in urinary 5 HIAA experienced a 6 month gain in estimated survival with an additional 6 month gain if the reduction was increased to 75%.
- Increases in liver enzymes or chromogranin A correlated with decreased survival.

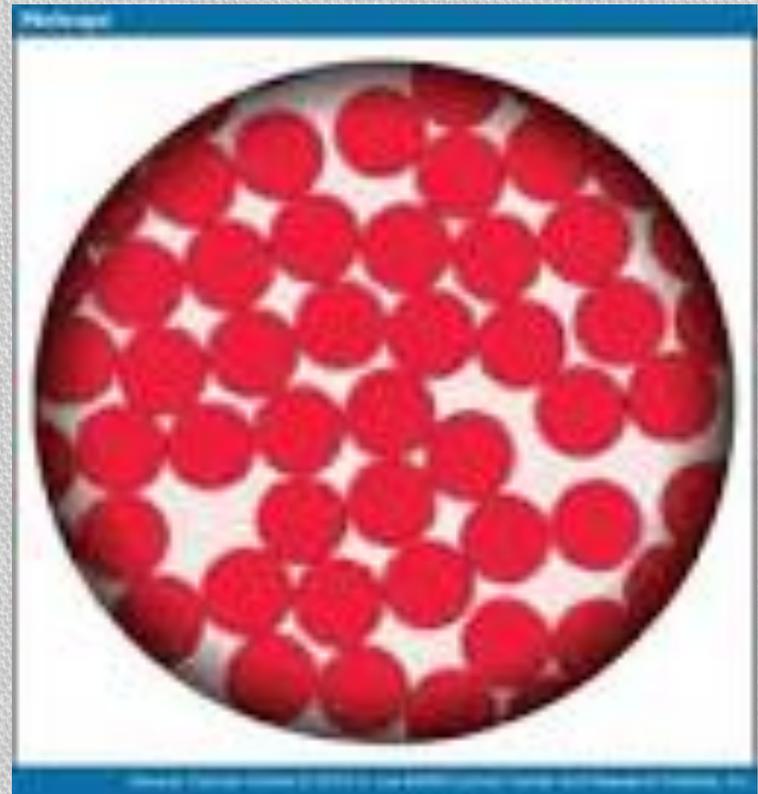
Repeat Embolization

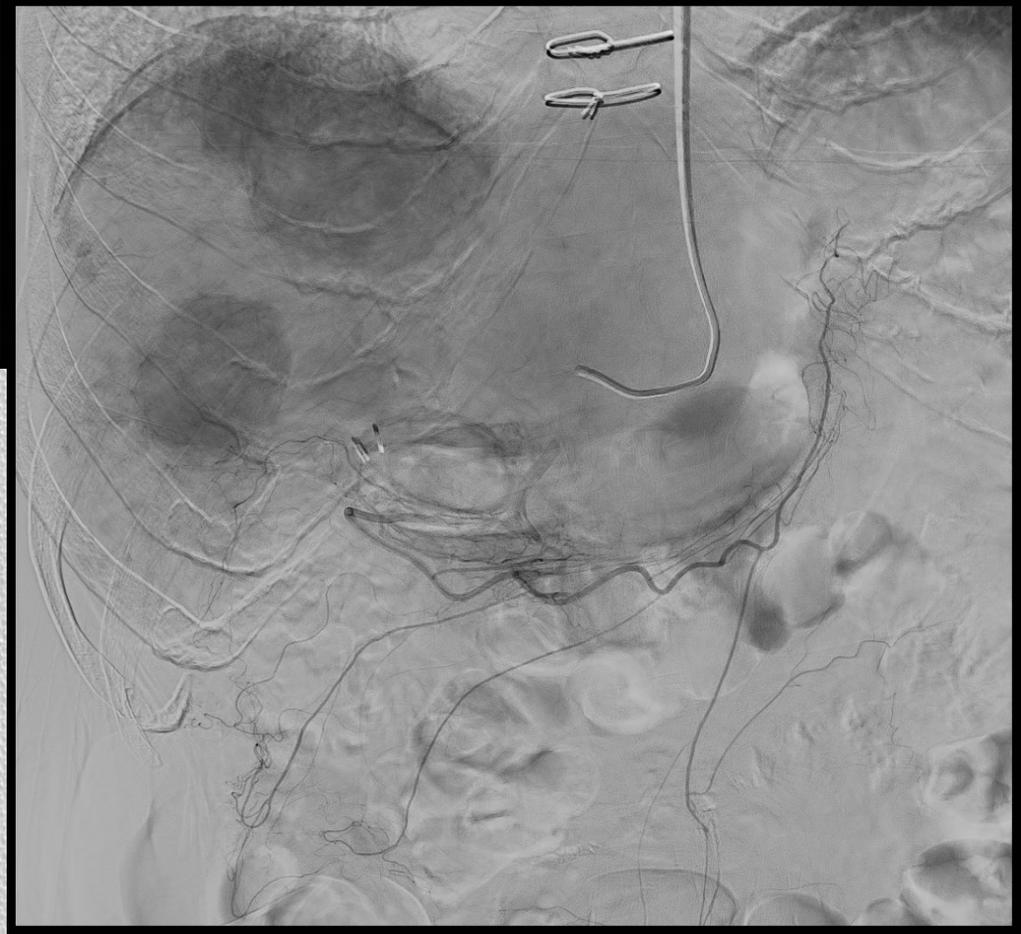
- Repeat embolization is often required; spaced out 4-6 weeks to allow for recovery.

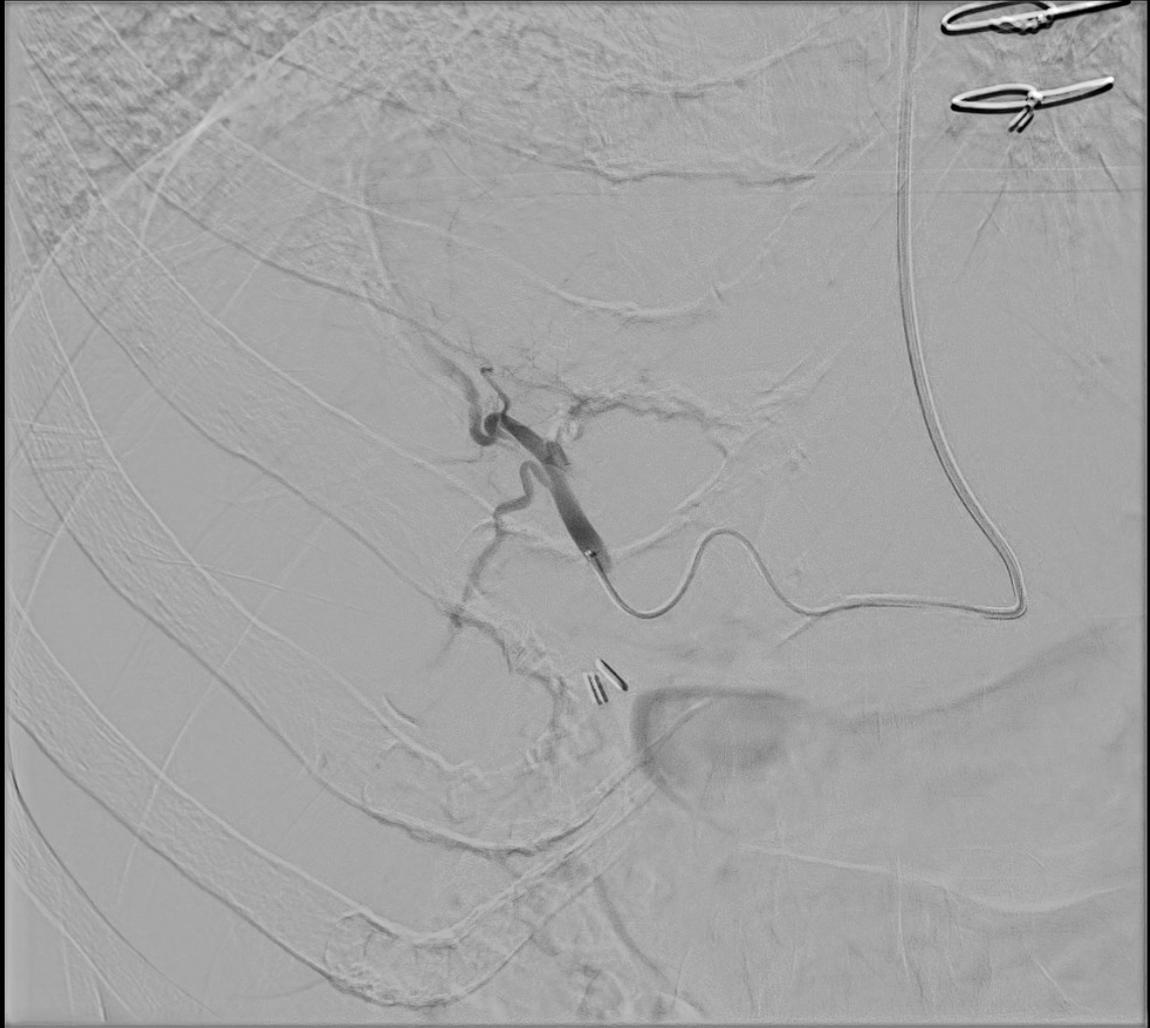


Complications

- Post embolization syndrome is very common post procedure (fever, nausea, vomiting, abdominal pain and elevated liver enzymes). Typically improves in 3-5 days. Low grade fever can persist for longer. This correlates with the amount of necrotic tumor created and is often a predictor for a good response.
- Hepatic failure, abscess, sepsis, nontarget embolization (gallbladder, stomach) are more infrequent complications. A bilioenteric anastomosis increases the risk of infection and often patients are given antibiotics and/or bowel prep prior to embolization.
- Cholecystitis can be seen in 1-3 % of patients.
- Mortality is very rare and often related to liver failure (under 3%).
- Ischemic cholangiopathy (injury to biliary tree) can be seen over time with repeated sessions. This is slightly more prominent in patients who receive chemotherapy.
- TAE and TACE complication rates are very similar.

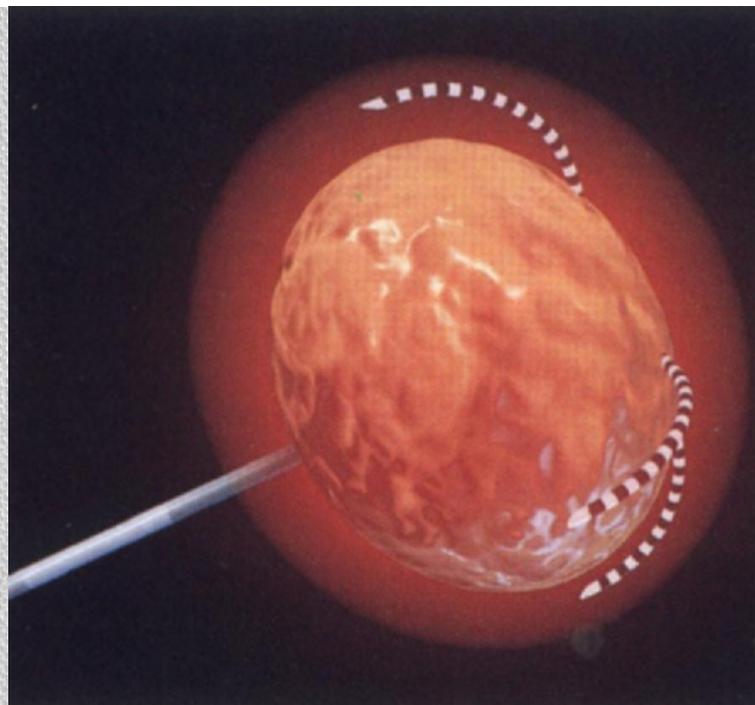
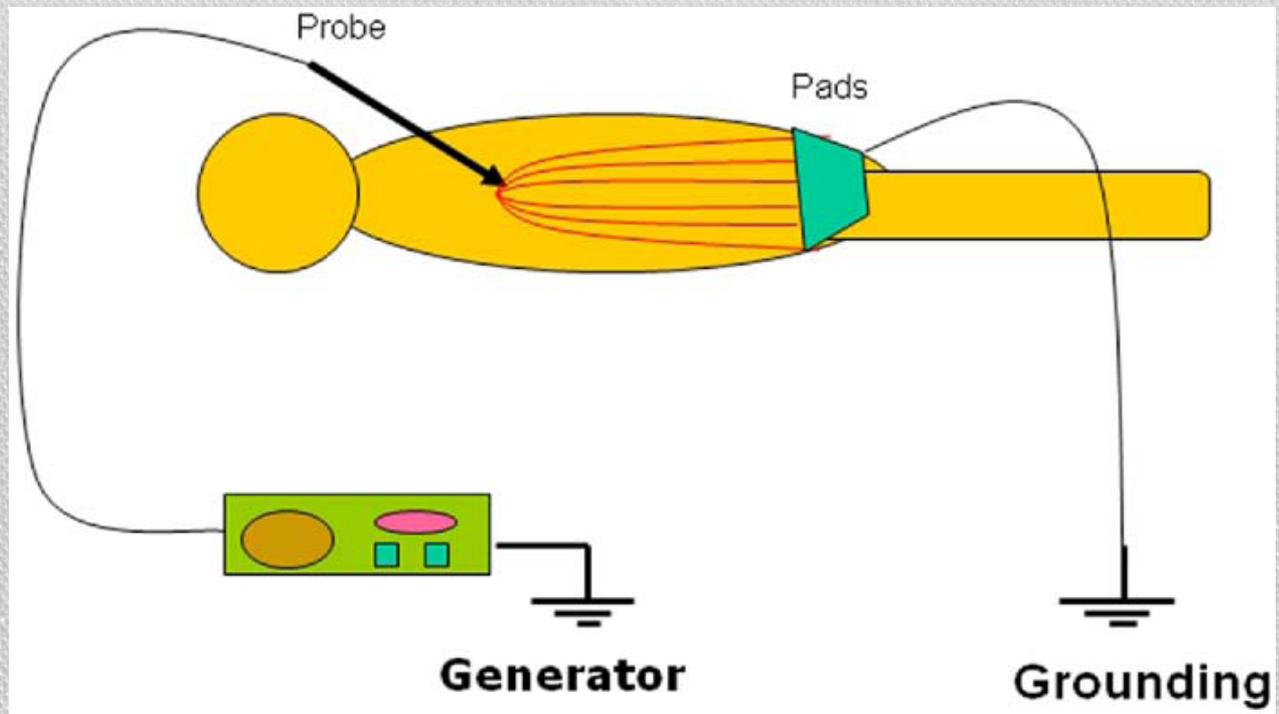




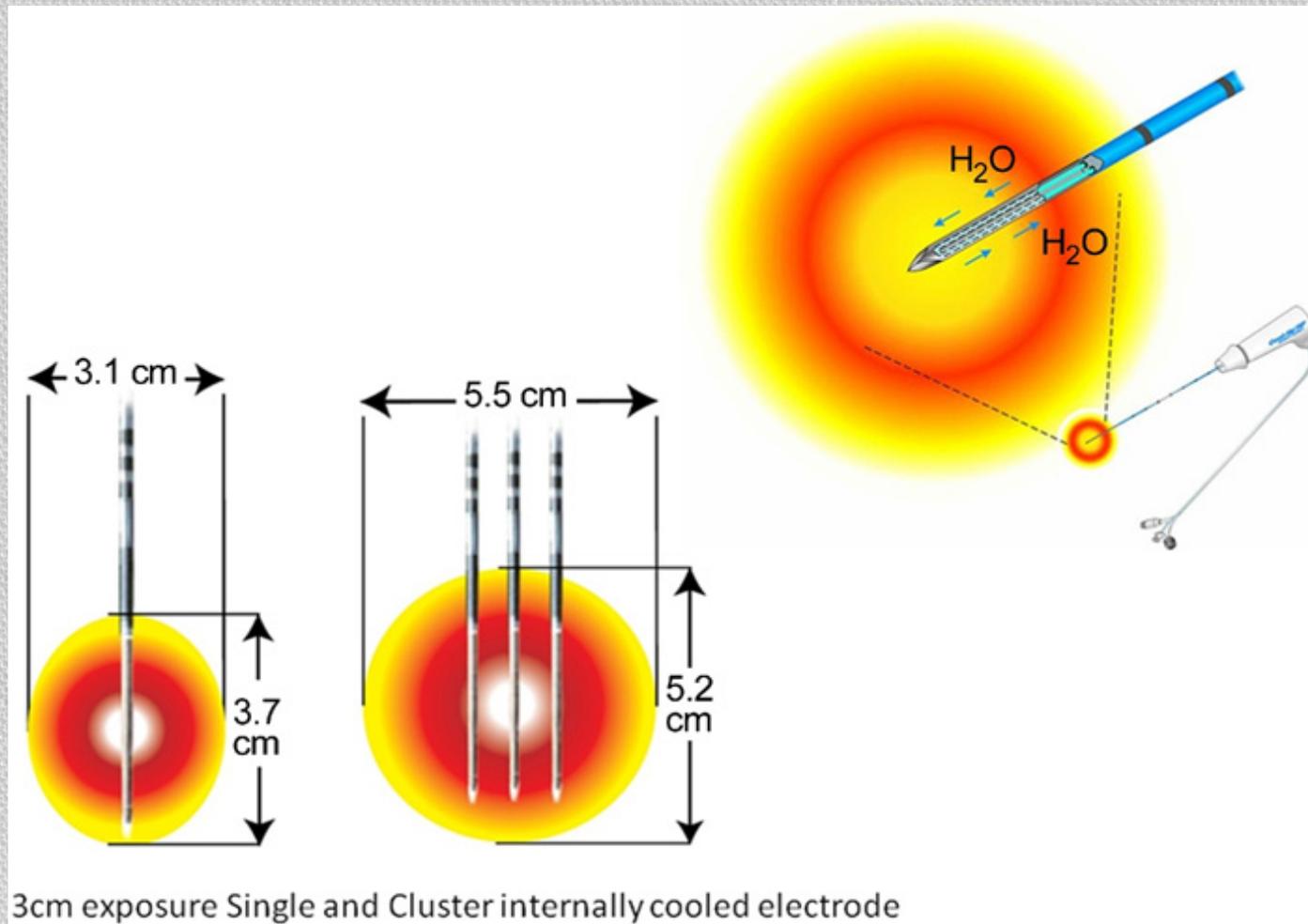


FOCAL ABLATION

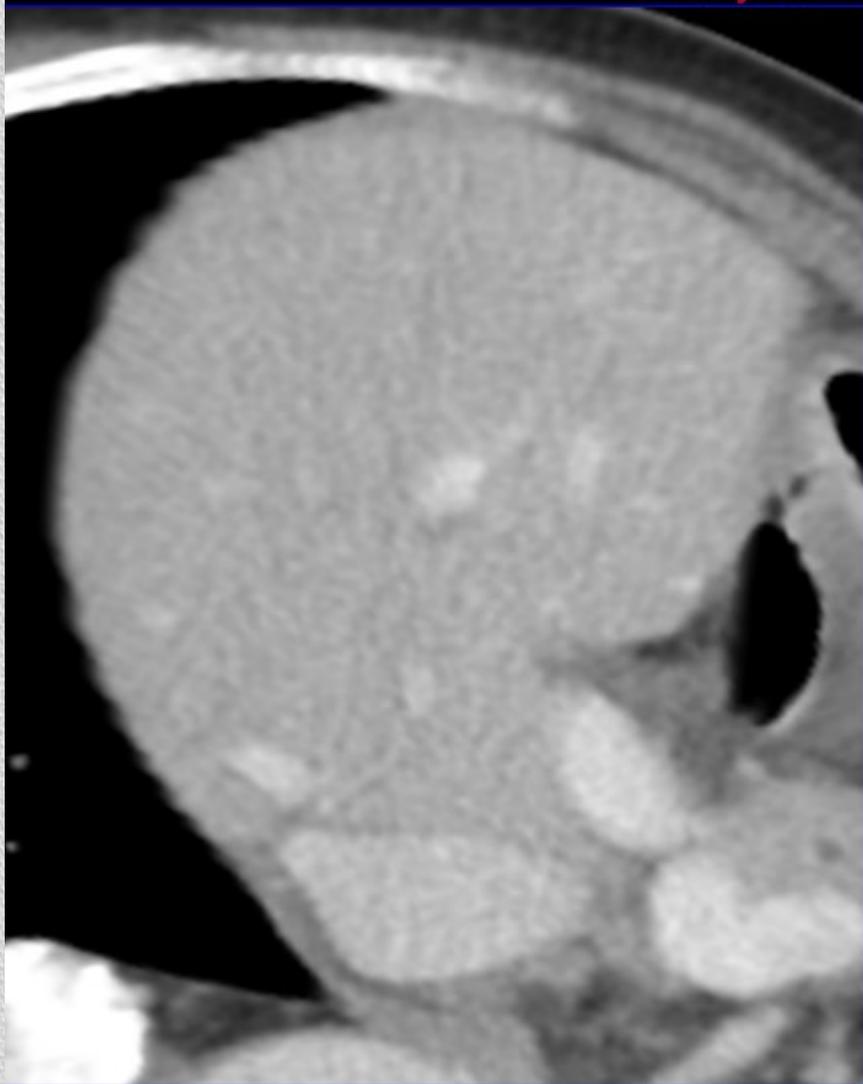
- Thermal ablation is a useful tool. It can be used to complement resection or treat small foci in critical areas that are difficult to reach via embolization.
- We use RFA (radiofrequency ablation) or microwave ablation. RFA uses an electric current. Intratumoral temperatures are 60-70C
- Microwave is a nonionizing form of radiation that creates oscillation of water molecules within the tumor creating frictional heat. You can reach higher intratumoral temperatures and it is not sensitive to heat sinks (blood vessels cooling areas of tumor in close proximity).
- No data comparing RFA to MWA for NET.
- Outpatient procedure when done percutaneously.
- We use it selectively to debulk during or after surgical resection or to treat small areas of recurrence when deemed appropriate.



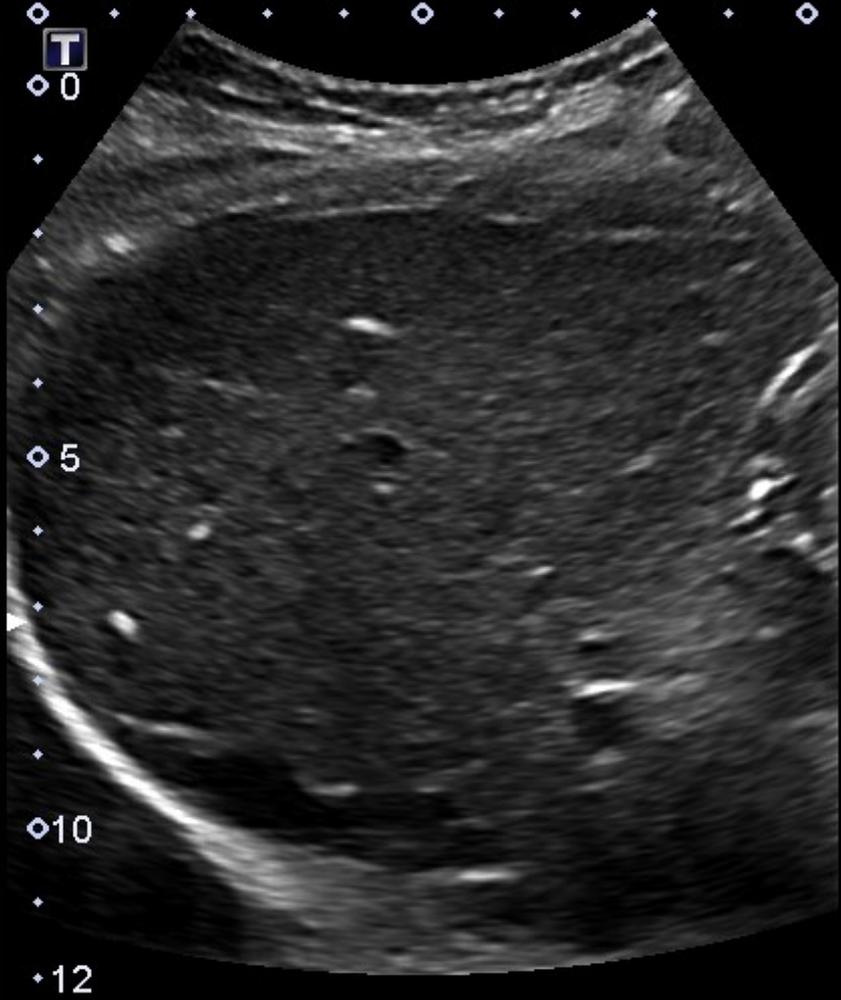
RFA – Covidien – internally cooled, monopolar, reduces charring

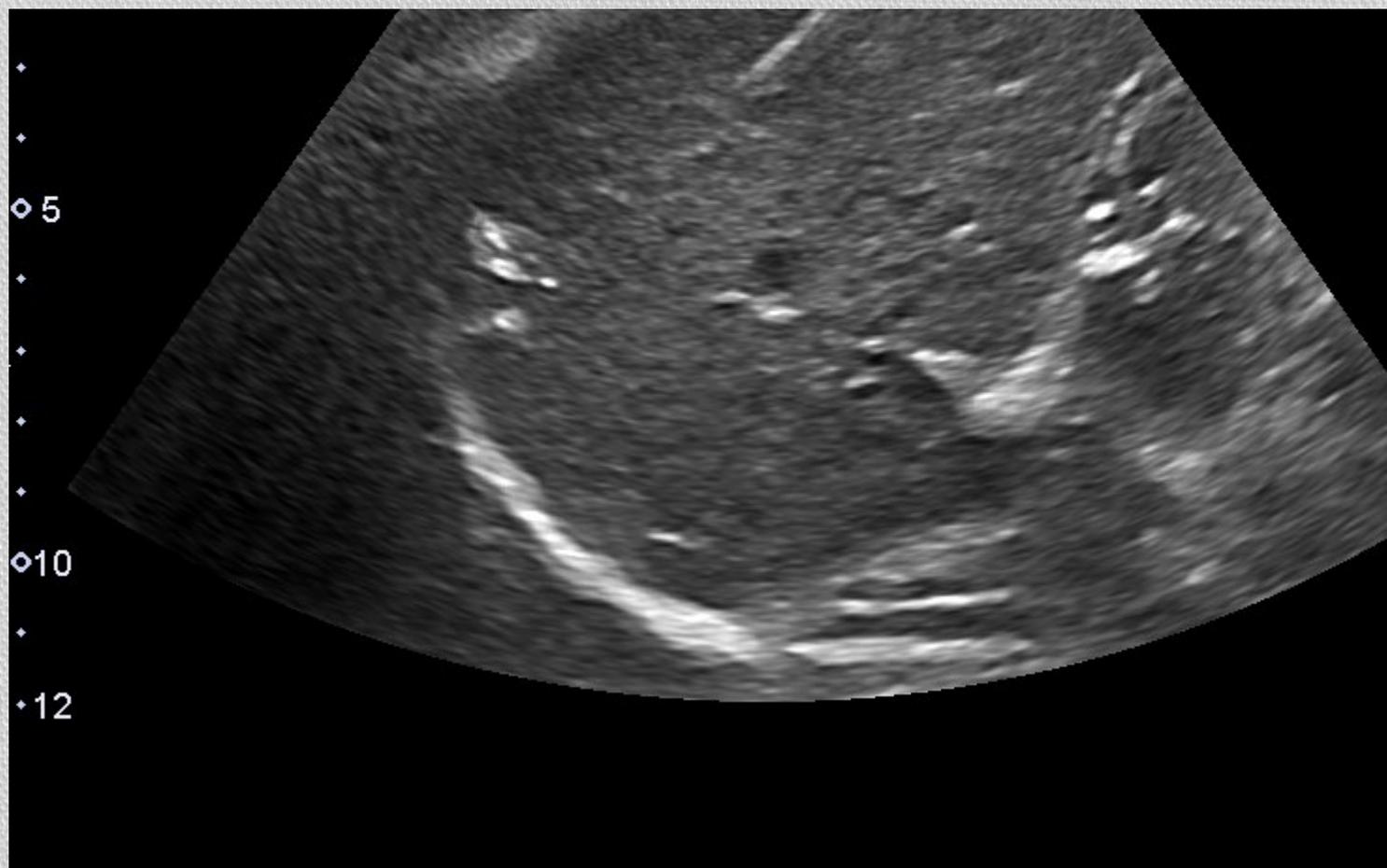


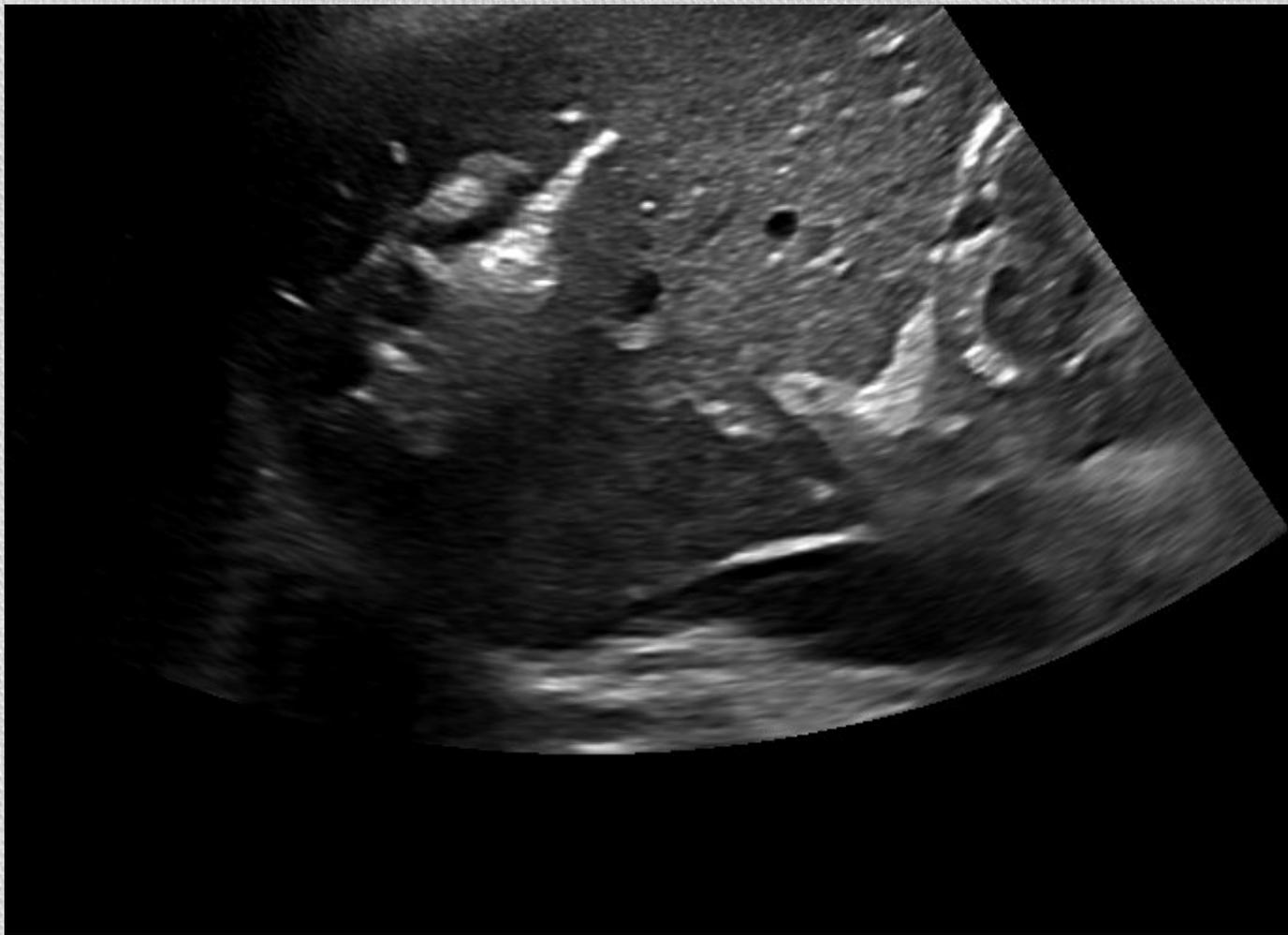
Quality : 5



Precision A Pure+



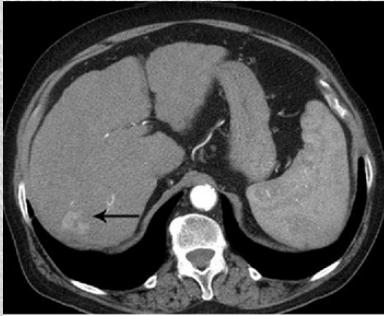




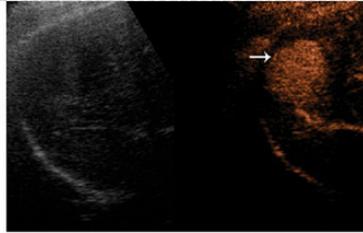
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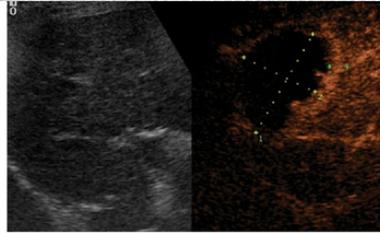
Thank you



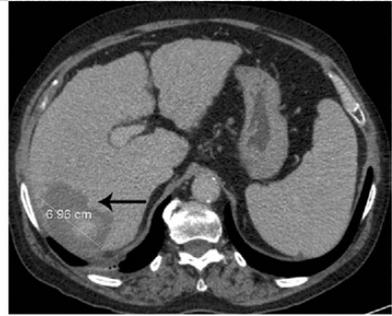
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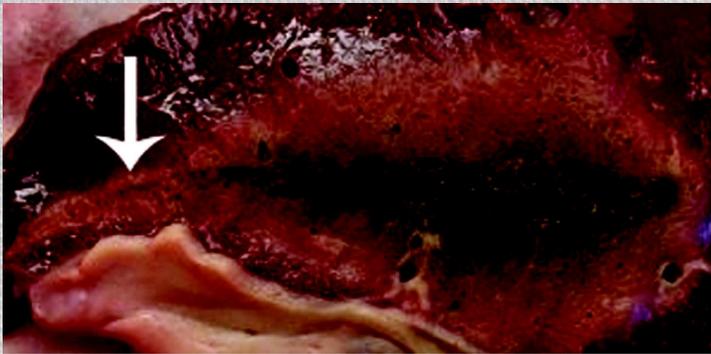
b.



c.



d.



a.



b.