

CHEMOEMBOLIZATION

TACE = Trans Arterial Chemo Embolization

Definition:

A combination of local delivery of chemotherapy and embolization to treat malignant lesion, *most often of the liver*.

Role:

Deliver a local and concentrated dose of **chemotherapeutic agents** directly into the arterial feeding vessels of the tumor*with* or *followed by*

Embolization using either permanent or temporary particulate materials.

→ The principles of TACE are consistent:

1. To deliver **a higher drug concentration** into the tumor than possible by systemic therapy.
2. Prolonging drug dwell time within tumor by **reducing washout**.
3. Most of the drug is **retained** within the tumor, ← reduction of systemic drug toxicity.

In general, no more than 50% of liver volume should be chemoembolized at a time.

4. Depending on the number and type of tumors, chemoembolization may be used:
 - As the **sole** treatment or
 - May be **combined** with other treatment options such as: surgery, chemotherapy, radiation therapy, or radiofrequency ablation.

The normal liver blood supply about **75 %** through the **portal vein** and only **25 %** through the hepatic artery. ***But Hepatic Tumor receives almost all of its blood supply from the hepatic artery.***

Indications:

1 - Hepatoma or hepatocellular carcinoma (primary liver cancer)

2 - Metastasis (spread) to the liver from:

- colon cancer
- breast cancer
- sarcomas
- carcinoid tumors and other neuroendocrine tumors
- islet cell tumors of the pancreas
- ocular melanoma

3 - Other vascular primary tumors in the body

Contraindications :

1. Impaired liver function

Per Procedure:

1. **Lab. Investigations:** bleeding profile, Kidney & liver function

2. **Hydration:** Intravenous (IV) fluids such as normal saline

250 cc/hour_4 hours then 150 cc/hour_6 hours

3. **Medications:**

➔ **Antibiotics:** Cefoxitin 2 g IV. If there is a history of biliary surgery, a more aggressive and longer course of antibiotics (10 days) is needed.

4. **Sedation**

CHEMOTHERAPEUTIC MIXTURE PREPARATIONS

1. **Conventional TACE** (triple agent) or (Cisplatin, Adriamycin, & Mitomycin [CAM] protocol)

- (50 to 100 mg doxorubicin + 50 mg cisplatin powder + 10 mg mitomycin.)
- These three + a total of **10 mL** of water soluble contrast material eg. Omnipaque.
- Emulsify previous mixture in **10 cc of iodized oil** → for a **total of volume of 20 cc.**

- Additional **particle** or **gel foam** embolization can be used at the end to achieve stasis in tumor vessels.

2. Other preparations as:

- a. Drug-eluting beads.
- b. Quadrasphere microspheres,

Procedure:

I → Preliminary Angiography:

- A routine abdominal **Aortogram** is performed → delineates visceral anatomy
- **The superior mesenteric artery (SMA)** is then selected with a VS-1 or RC-1 catheter and an arteriogram is performed.
 - With large contrast volume (e.g., **5 mL /second for 25 mL total volume**) to assess for variant anatomy, unconventional feeding arteries to tumors,
 - **The venous phase**, assess portal vein patency and flow.
 - Next, **the celiac artery** is selected and a selective arteriogram is performed to look for arterial supply to:
 - Tumors.
 - Identify vessels that should not be embolized such as vessels to the gallbladder, stomach, and intestines
 - Vessels to the stomach or intestines should not be chemoembolized.
 - **Coil embolization** May rarely be needed prior to chemoembolization if they are at **risk for reflux**.

Once the arterial feeding vessels to the tumor(s) are identified, they are super selected for chemoembolization.

II → Chemoembolization:

- **A micro-catheter** (as the Renegade Hi Flow1 catheter), usually used due to small size of the tumor vessels, it is used in a coaxial fashion.
- **Chemotherapeutic mixture is** injected in selected vessels *followed by embolization, with Gelfoam or polyvinyl alcohol (PVA) particles.*
- **In Multiple lesions** the same is used. Unless tumor burden is large, there is usually enough chemoagents to achieve near stasis or decreased flow, and stasis is achieved with Gelfoam or particles.

Post Procedure:

- **Liver function** Tests , including total bilirubin, (AST), and (ALT) levels, may evaluated after TACE.
- **Antibiotics:** - Used specially with non competence sphincter of oddi. (G –ve spectrum).
 - Begin with IV , then oral course.
- **Pain killers:** - As narcotics.
- **Imaging follow-up:**
 - Necessary to evaluate for **response** and plan for **future therapy**.
 - Patients get cross-sectional imaging **6 to 8 weeks** post-procedure.
 - In the presence of **viable tumor** seen as contrast enhancement, the patient returns for **repeat treatment**.
 - For patients **without active disease**, we follow with cross-sectional imaging every **3 to 4 months**.

N.B. **HCC when small** with good liver functions is best treated with **resection**.

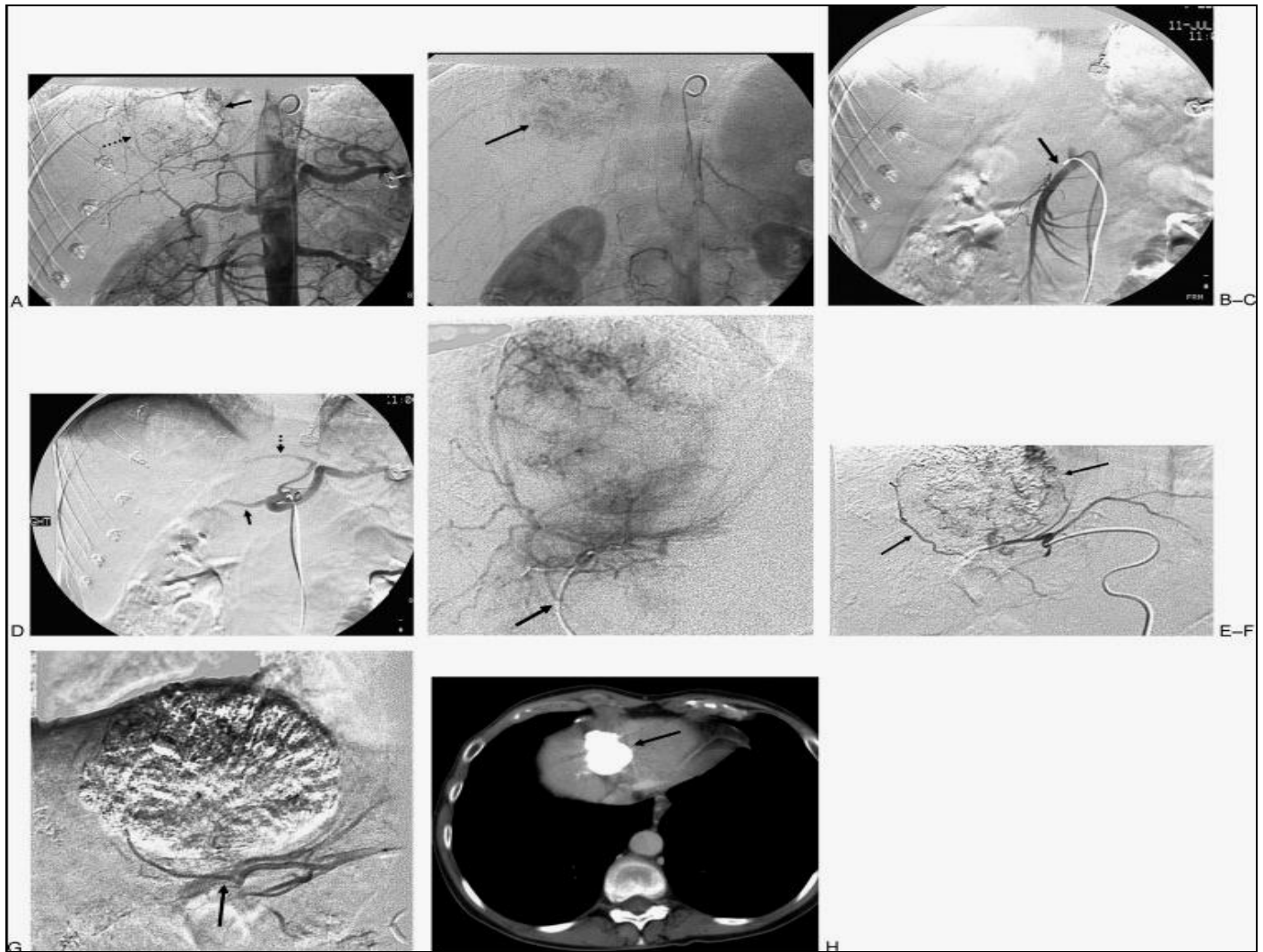
Liver transplantation can eliminate the tumor and also the underlying disease.

TACE has been shown to have survival benefits in patients with **unresectable HCC**.

TACE using a single chemotherapeutic agent can be performed safely and effectively in HCC patients who previously underwent PV Embolization.

Complications:

- I- General Complications: As any Procedures.
- II- Complications of undesired Embolization.



A 62-year-old man with cirrhosis and hepatocellular carcinoma (HCC) presents for transarterial chemoembolization (TACE)

(A) Abdominal aortogram, **late arterial phase**, shows arterial supply from the right (dashed arrow) and left (arrow) hepatic arteries.

(B) Abdominal aortogram, **late venous phase**, shows persistent blushing in the tumor (arrow).

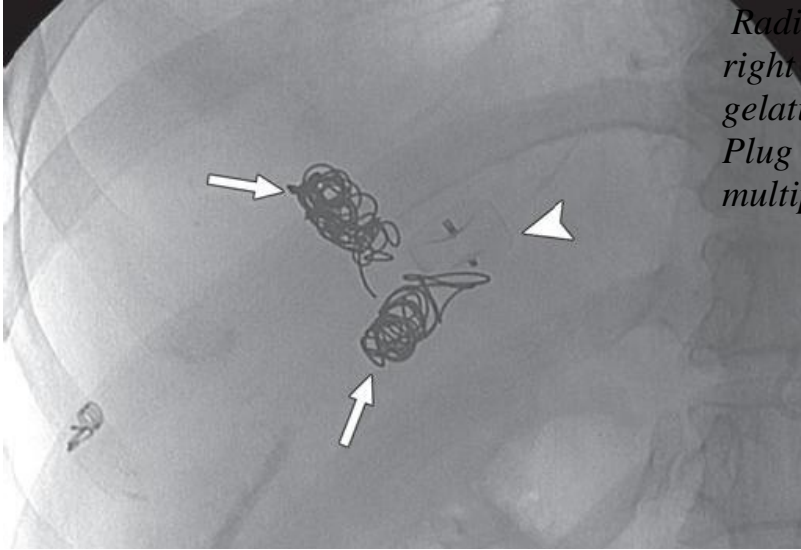
(C) **Superior mesenteric arteriogram** (arrow) shows normal anatomy (i.e., no replaced or accessory right hepatic artery or other variant). In the portal venous phase (not shown), the portal vein was patent.

(D) **Celiac arteriogram** shows patent common hepatic artery (arrow) and a replaced left hepatic artery (dashed arrow).

(E) **Super-selective** arteriogram of the feeding artery the right hepatic artery with a microcatheter (arrow) was performed followed by TACE. **(F)** Replaced left hepatic arteriogram shows feeders (arrows) to the tumor.

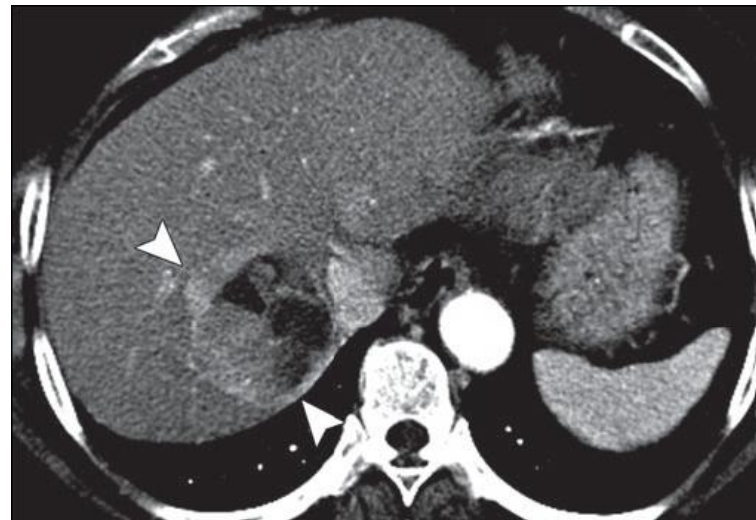
(G) **Postembolization angiogram** of the feeders showed stasis (arrow) of the vessels and iodized oil staining of the tumor.

(H) Follow-up computed tomography (CT) one year later showed residual iodized oil (arrow) within the tumor and no enhancement to suggest residual tumor.

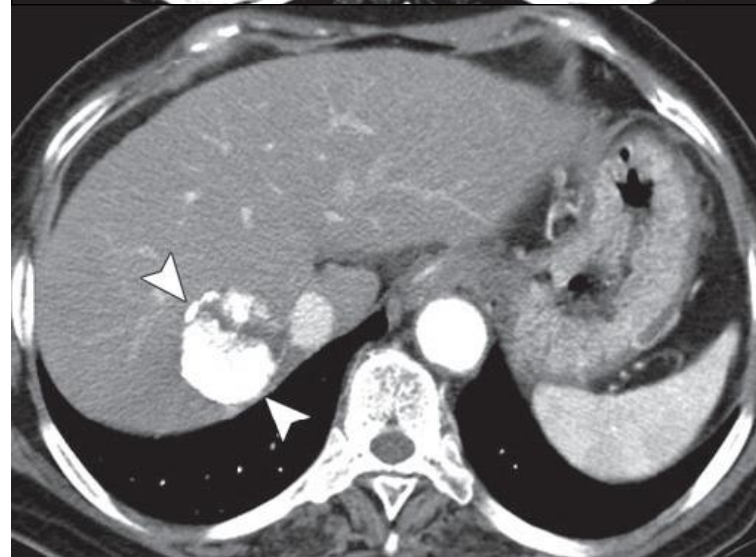


Radiograph shows patient underwent right portal vein embolization using gelatin sponge with Amplatzer Vascular Plug (AGA Medical) (arrowhead) and multiple coils (arrows).

B, Contrast-enhanced axial CT image (arterial phase) obtained 2 days before transarterial chemoembolization (TACE) shows heterogeneously enhancing mass (5.8×5 cm) (arrowheads) in segment VII (larger than in prior studies).



C, Contrast-enhanced axial CT image (arterial phase) obtained 8 months after TACE shows compact iodized oil (Lipiodol, Laboratoire Guerbet) uptake in tumor (arrowheads) and decrease in tumor size (4×4 cm).



REFERENCES:

✂ SEMINARS IN INTERVENTIONAL RADIOLOGY/VOLUME 26, NUMBER 3
2009: Thuong G. Van Ha, M.D., Department of Radiology, University of Chicago
Medical Center, 5841 S. Maryland Avenue, MC 2026, Chicago, IL 60637

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Visceral Arterial Intervention; Guest Editor, Sanjeeva P. Kalva, M.D. Semin Intervent Radiol 2009;26:270–275. Copyright # 2009 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA. Tel: +1(212) 584-4662. DOI 10.1055/s-0029-1225672. ISSN 0739-9529. 270

✂ <http://www.radiologyinfo.org/en/pdf/chemoembol.pdf>

✂ Dong Gwon , Kyu-Bo Sung ., et al , AJR , Nov 2009; 193:W446–W451

✂ <http://emedicine.medscape.com/article/421608-overview>

✂ <http://emedicine.medscape.com/article/421608-overview#showall>

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