

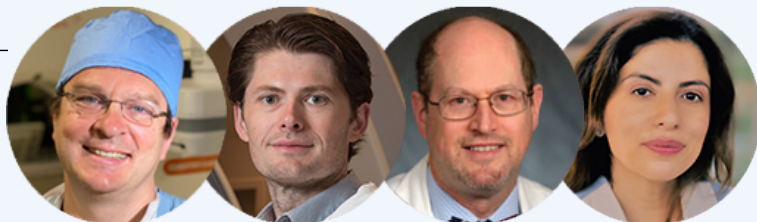
OPTIMIZING THE USE OF **Ethiodized Oil in Interventional Radiology**



FREQUENTLY ASKED QUESTIONS

*An Interview With Drs. Maxim Itkin,
Gregory Nadolski, Michael Soulen,
and Gloria Salazar*

Recorded on March 6th and April 18th, 2024



In this transcript, Dr. Itkin interviews Drs. Soulen, Nadolski, and Salazar on frequently asked questions regarding the use of ethiodized oil in interventional radiology. Please review the prescribing information for approved indications and comprehensive safety information regarding its administration.

Dr. Itkin: What are the side effects of ethiodized oil when used for hepatic chemoembolization?

Michael Soulen, MD: When ethiodized oil is used for chemoembolization, much of what patients consider to be “side effects” are the result of liver ischemia and not the oil itself. One of these effects is postembolization syndrome—any time you embolize a solid organ, patients experience pain, nausea, vomiting, fever, fatigue, loss of appetite, and general malaise for days to weeks after the procedure. Proper hydration and intra-arterial lidocaine during the procedure are important. Supportive perioperative management should include triple antiemetic therapy and pain management. Cyclo-oxygenase 2 inhibitors and narcotics for pain have been shown to improve outcomes after embolization.

Caution should be taken regarding the dose, or volume, of ethiodized oil used during procedures. The package insert recommends dose cutoffs around 15 to 16 mL—the toxic dose is about 0.2 mL/per kg. Any remaining oil that is not selectively taken up and is retained in the tumors will pass through the liver, ultimately traversing the pulmonary vasculature. This migration may precipitate lipid pneumonia or acute pulmonary failure if the oil is overdosed in the arterial system or if there is significant arterial venous shunting.

References

Blackburn H, et al. *Cancer Nurs*. 2016;39(5):E1-E18.

Ethiodized oil injection. Updated 2020. Accessed March 15, 2024. https://www.accessdata.fda.gov/drugsatfda_docs/label/2020/009190s029s031lbl.pdf

Dr. Itkin: In general, how much ethiodized oil should be administered during chemoembolization procedures?

Michael Soulen, MD: Caution should be taken regarding the dose, or volume, of ethiodized oil injected during chemoembolization procedures. The package insert recommends dose cutoffs around 15 to 16 mL, and the reported toxic dose is about 0.2 mL/ kg.

Residual oil that is not selectively taken up and retained in tumor tissue will pass through the liver and out into the venous system. Excess oil that has traversed the pulmonary vasculature can cause lipid pneumonia or acute pulmonary failure (particularly in the setting of overdose within the arterial system or a high degree of arterial venous shunting).

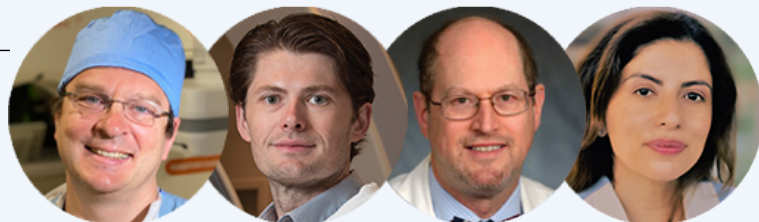
OPTIMIZING THE USE OF **Ethiodized Oil in Interventional Radiology**



FREQUENTLY ASKED QUESTIONS

*An Interview With Drs. Maxim Itkin,
Gregory Nadolski, Michael Soulen,
and Gloria Salazar*

Recorded on March 6th and April 18th, 2024



Dr. Itkin: What are the contraindications to the use of ethiodized oil in patients with hepatocellular carcinoma?

Michael Soulen, MD: Contraindications to the use of ethiodized oil in interventional radiology procedures primarily involve concerns regarding hepatic reserve. Historically, predictors of adverse outcomes have included a tumor burden exceeding 50% combined with bilirubin levels above 2 mg/dL, aspartate aminotransferase levels surpassing 100 units/L, and lactate dehydrogenase (LDH) levels over 425 units/L. However, the LDH component is no longer routinely measured. Ethiodized oil is absolutely contraindicated in patients who have all of these characteristics due to the high risk for mortality following chemoembolization.

Other factors influencing hepatic reserve should also be considered, with careful evaluation necessary to ensure that patients can tolerate the procedure safely. Patients with prior biliary intervention, such as a Whipple procedure or biliary stent placement, are at heightened risk due to potential bile duct injury during embolization. This can lead to complications, such as liver abscesses, in persons without an intact sphincter of Oddi. Antibiotic prophylaxis may be insufficient in preventing abscess formation, leading some patients to choose alternative therapies like transarterial radioembolization to minimize biliary injury.

References

Ishimaru H, et al. *World J Gastroenterol*. 2018;24(37):4291-4296.

Xu H, et al. *Cancer Manag Res*. 2021;13:5039-5052.

Ethiodized oil injection. Updated 2020. Accessed March 15, 2024. https://www.accessdata.fda.gov/drugsatfda_docs/label/2020/009190s029s031lbl.pdf

Dr. Itkin: Are you aware of any allergic reactions to ethiodized oil?

Michael Soulen, MD: Allergic reactions are rare. Ethiodized oil is a form of poppy seed oil that contains iodine and should be avoided in patients with a history of sensitivity to other iodinated contrast agents.

References

Ethiodized oil injection. Updated 2020. Accessed March 15, 2024. https://www.accessdata.fda.gov/drugsatfda_docs/label/2014/009190s024lbl.pdf

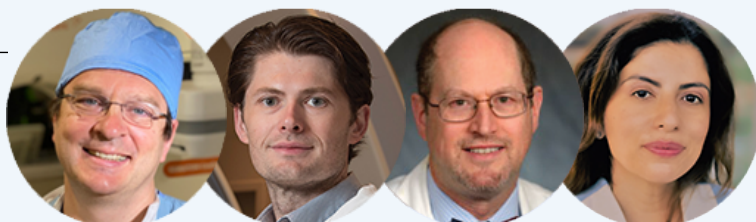
OPTIMIZING THE USE OF **Ethiodized Oil in Interventional Radiology**



FREQUENTLY ASKED QUESTIONS

*An Interview With Drs. Maxim Itkin,
Gregory Nadolski, Michael Soulen,
and Gloria Salazar*

Recorded on March 6th and April 18th, 2024



Dr. Itkin: What are the contraindications to the use of ethiodized oil in lymphangiography?

Gregory Nadolski, MD: Contraindications to the use of ethiodized oil in lymphangiography often involve the severity of lymphedema and the risk for exacerbating symptoms. Patients with extreme lymphedema, particularly those with severe and debilitating manifestations, pose a significant concern due to the potential for exacerbation of symptoms following ethiodized oil injection by further slowing the flow of lymph through the system. Relative contraindications may exist in patients with preexisting, less severe lymphedema, necessitating careful discussion with the patient regarding potential risks and benefits.

Another contraindication is in patients with known right-to-left shunts. If ethiodized oil reaches the venous circulation, it could lead to a cerebral embolism. Although certain conditions, such as patent foramen ovale, are not absolute contraindications, caution is warranted, especially in patients with a history of paradoxical embolism or known right-to-left shunts. Communication to the systemic arterial circulation, which could result in distal embolization, is also a contraindication to ethiodized oil administration during lymphangiography.

References

O'Brien BM, et al. *Plast Reconstr Surg*. 1981;68(6):922-9226.

Li Z, et al. *Chin Med J (Engl)*. 2011;124(24):4355-4358.

Ethiodized oil injection. Updated 2020. Accessed March 15, 2024. https://www.accessdata.fda.gov/drugsatfda_docs/label/2020/009190s029s031lbl.pdf

Dr. Itkin: How long does ethiodized oil remain in the lymph nodes?

Gregory Nadolski, MD: The length of time that ethiodized oil remains in the lymph nodes is somewhat uncertain. It undergoes a gradual degradation and clearance process in the body following administration. Macrophages likely play a role in the ongoing removal of this substance from the lymphatic system. Initially, a significant presence of ethiodized oil may be observed in the lymph nodes but visibility diminishes over time.

After several months or years, minimal remnants of ethiodized oil may be detectable, often appearing as sparse speckles on imaging studies, such as computed tomography scans. It is notable that ethiodized oil can remain in the lymph nodes for extended periods, potentially leading to misinterpretation of residual oil as calcification on certain imaging studies.

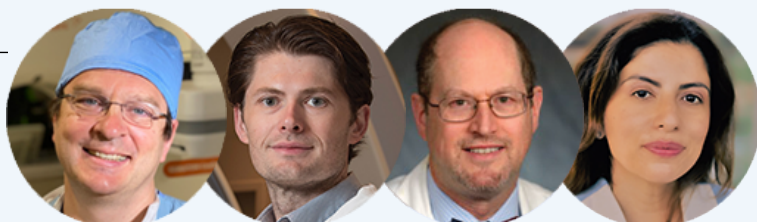
OPTIMIZING THE USE OF **Ethiodized Oil in Interventional Radiology**



FREQUENTLY ASKED QUESTIONS

*An Interview With Drs. Maxim Itkin,
Gregory Nadolski, Michael Soulen,
and Gloria Salazar*

Recorded on March 6th and April 18th, 2024



Dr. Itkin: When performing hysterosalpingography (HSG) procedures, how do you decide when to use water-soluble versus oil-based contrast agents?

Gloria Salazar, MD: There is an evolving nature of protocols surrounding HSG. In my practice, we perform an initial assessment with water-soluble contrast to ascertain tubal patency through a 20-minute spillage test. If tubal obstruction is identified, subsequent treatment involves the clearance of obstructions followed by flushing with ethiodized oil. This approach aligns with recent literature indicating enhanced fertility outcomes associated with such procedures, particularly in patients with tubal ligation or uterine abnormalities. There are global variations in HSG protocols and evidence supporting the dual diagnostic and therapeutic roles of contrast agents in improving fertility rates. Patient selection is also very important – some studies suggest reduced efficacy in patients with prolonged infertility of 5 years or more, emphasizing the importance of considering both procedural efficacy and patient-specific factors in achieving desired clinical outcomes.

References

Burks HR, Hansen KR. *Fertil Steril*. 2020 Jul;114(1):75-76.

Dr. Itkin: What method do you use when mixing ethiodized oil and sclerosant agents for procedures to treat pelvic venous disorders?

Gloria Salazar, MD: I employ a standardized approach in my practice, using a 3-2-1 mixture comprising air, sodium tetradecyl sulfate (STS), and ethiodized oil to treat pelvic venous disorders (also known as pelvic congestion syndrome). I adjust the concentration of STS, selecting either a 3% or 1% formulation based on the specific requirements of the procedure. I also use polycarbonate syringes and stopcocks to facilitate the mixing of the oil-based components and smooth delivery through catheters. In cases involving large, dilated pelvic reservoirs, such as gonadal or ovarian veins exceeding 16 millimeters in diameter, I use this protocol to optimize embolization of the periuterine vessels.