DESCRIPTION: Ethiodol, brand of ethiodized oil, is a single injectable radio-opaque diagnostic agent for use in hysterosalpingography and lymphography. It contains 37% iodine (41 mg/mL) preferably combined with small amounts of the fatty acids (primarily oleic and stearine) indispensable and essential for the normal development of the foetus. It is not radioactive and is biologically inert. Ethiodol is used only in the female. Ethiodol is a clear to amber-colored, liquid fluid, which becomes yellowish with increasing concentration. Ethiodol has a surface tension of 32 dynes/cm at 20°C yielding a viscosity of 5.5 - 10.0 poises. This high viscosity provides a new feasibility for radiographic exploration.

CLINICAL PHARMACOLOGY: There has been little detailed investigation of the metabolic fate of Ethiodol in either man or animals. The drug is known to be eliminated from the body in the urine and urine and feces. The amount eliminated in the urine and feces is about 10% and 20%, respectively. The drug is absorbed from the site of injection into the bloodstream and is eliminated from the body by the renal route. Ethiodol is excreted in the presence of urine.

The timing and choice of anesthesia following Ethiodol injection may be influenced by consideration of the above noted increase in pulmonary and capillary blood flow and dilution capacity. It should be noted that although an average of 2 to 3 days was required for complete reversibility for such patients, the patient's tolerance and the incidence of pulmonary complications are frequently encountered. The following symptoms may be noted:

1. Transient edema or exacerbation of pre-existing lymphedema, as well as thromboembolic events may occur.
2. Sodium retention and edema are not uncommon.
3. Pulmonary infarction, although not infrequent, occurs in patients with advanced pulmonary disease, especially those with a right-to-left cardiac shunt, in patients with emphysema, and in patients who have had aortic valvotomy or endarterectomy.
4. Pulmonary infarction, although rare, has occurred in patients without evidence of pre-existing pulmonary disease.

The safety of intraoperative Ethiodol has not been established in pregnant women, and accordingly, its use should be restricted to such situations where it is deemed necessary.

PRECAUTIONS: Ethiodol, although abdominal pulmonary embolization occurs in a majority of patients following Ethiodol lymphography, clinical evidence of such embolization is infrequent and it is usually of a transient nature. Such clinical manifestations are usually immediate, but may be delayed from a few hours to days. It should appear that it is advantageous to use the smallest volume of Ethiodol necessary for radiographic visualization. For this reason, and to prevent inadvertent venous administration, radiographic monitoring of a patient required during the injection of Ethiodol. The timing and choice of anesthesia following Ethiodol injection may be influenced by consideration of the above noted increase in pulmonary and capillary blood flow and dilution capacity. It should be noted that although an average of 2 to 3 days was required for complete reversibility for such patients, the patient's tolerance and the incidence of pulmonary complications are frequently encountered. The following symptoms may be noted:

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PRECAUTIONS: Ethiodol is contraindicated in patients hypersensitive to it. Ethiodol should not be injected intrathecally or intravascularly, or used in bronchography. A history of sensitivity to any of the iodine compounds, or to the contrast material used in radiography, should be a definite rule of adverse reactions. While most reactions are minor, wheezing and facial reactions may occur with intravenous injection. The iodinated factor should always be carefully evaluated. It is not advisable for all patients to have a history of cyanosis, nausea or vomiting, laryngospasm, or hypotension or other severe symptoms.

The use of a retaining cannula:

It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk and because of the possibility of serious adverse reactions in nursing infants from Ethiodol, a decision should be made whether to discontinue the drug or to discontinue the nursing infant.

ADVERSE REACTIONS: Hypersensitivity reactions, foreign body reactions and exacerbation of pre-existing lymphedema may occur in patients with serum sickness-like reactions. In such patients, symptoms usually observed with ethiodized oil may be observed. However, symptoms are usually observed in an asthmatic patient. The most frequent symptoms are sneezing, coughing, and wheezing. The drug is not radioactive and is biologically inert. Ethiodol has been excreted in the urine and feces. The amount eliminated in the urine and feces is about 10% and 20%, respectively. The drug is absorbed from the site of injection into the bloodstream and is eliminated from the body by the renal route. Ethiodol is excreted in the presence of urine.

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ADVERSE REACTIONS: The common observation of pulmonary Ethiodol embolization (interstitial pulmonary edema) has been reported. This effect is not infrequent when large amounts of Ethiodol have been used (in the presence of marked lymphatic obstruction or infiltration). Although rare, one other side effects reported include transient fever, lymphadenopathy, edema, nausea, vomiting, cough, skin rash, fever, subcutaneous, deep dermal, and periarterial fibrosis. Delayed wound healing of the site of injection and secondary infection are occasionally seen, and can be prevented or minimized by adhering to strict sterile technique.

Transient edema or exacerbation of pre-existing lymphedema, as well as thromboembolic events have also been reported in the extremity sarcoma. Ethiodol and
Inferior vena cava obstruction the contraindication may be shunted partially to the liver, resulting in hepatic embolization. Also, when accidental intravenous administration of Ethiodol results in a conical-shaped amount of the medium existing in the circulation, embolization other than pulmonary may occur as reported in the literature. Therefore, for diagnostic purposes, in combination with the clinical evaluation, it is probably deemed the necessity of the patient’s to the entire circulation. 

**DOSAGE AND ADMINISTRATION:** This method applies for both the upper and lower extremities. A lymphatic vessel is selected for cannulation.

A sterile technique should be employed in a supine position on a portable stretcher or on a Mayo table. When available, a radiolucent pad will add to the patient’s comfort during the one to two hours required for completion of the examination. It is important that the patient be in a cooperative state. Pronunciation might be achieved in the upper extremities of patients.

In the supine position, the extremities should be immobilized during the entire procedure to prevent displacement of the needle. Tensor tibialis have been satisfactorily employed for this purpose. The extensor muscles of the extremity should be carefully held in check by the instrument to avoid the upper extremities.

The skin and injection instruments and materials include the following:

- Sterile pediatric codon and sterile towels for draping, sponges, etc.
- Local anesthetic, such as procaine hydrochloride, and a syringe
- Anesthetic carrying solution
- 20 mL syringe containing 15 mL of Ethiodol with an 18 inch catheter to which a 27 to 30 gauge needle (Haldex lymphography is aodoch, two syringes should be prepared)

Under local infiltration anesthesia, a transverse, curvilinear or longitudinal small skin incision should be made near the ankle or wrist (just lateral and distal to the first metatarsal head on the dorsum of the foot, or just over the “snuff-box” in the dorsum of the hand).

At the completion of the injection, anteroposterior roentgenograms are obtained of the legs or arms.

Upon superficial dissection (but not penetrating the subcutaneous tissue), lymph vessels will be noted in the immediate subcutaneous tissue, while larger lymph vessel trunks are found in the anatomical area to be visualized. Therefore, and to prevent inadvertent venous administration, fluoroscopic monitoring or serial radiographic guidance of patients is recommended during the injection of Ethiodol.

The patient is instructed to elevate the leg as soon as possible to promote healing. The incision is closed by suturing the released lymphatic vessels and loose tissue are removed and the wound well washed with saline to remove, if possible, any in case of reflux type lymphomas, the cannulated large lymphatic vessels may have to be closed by catgut to avoid development of a lymphocele.

A. With a known hypersensitivity to Ethiodol

B. With a history of a hypersensitivity to Ethiodol

C. With advanced pulmonary disease, especially those with alveolar-capillary block.

D. With known radiation therapy to the lungs.

The rate of speed at which the contrast medium may be introduced varies and is dependent upon the nature of the lymphatics in the individual patient. If the injection is proceeding at too rapid a tempo, extravasation will be noted and the patient may refer to pain in the foot, leg or arm.

At the completion of the injection, anteroposterior roentgenograms are obtained of the legs or arms, films, and adequate radiographic exposure of lymph nodes is made. This will provide better delineation of lymph nodes and permit more concise evaluation of nodal architecture.

As a general rule, the smallest possible amount of Ethiodol should be employed according to the anatomical area to be visualized. Therefore, to obtain indirect venous administration, fluoroscopic monitoring or serial radiographic guidance of patients is recommended during the injection of Ethiodol.

The pediatric patient, a minimum of 1 mL to a maximum of 6 mL, is a maximum of 6 mL, should be employed.

**SUMMARY OF STEPS TO AVOID COMPLICATIONS IN LYMPHOGRAPHY**

1. **Contraindication to patients:**
   - A. With a known hypersensitivity to Ethiodol
   - B. With a history of a hypersensitivity to Ethiodol
   - C. With advanced pulmonary disease, especially those with alveolar-capillary block.
   - D. With known radiation therapy to the lungs.

2. **Procedure with caution:**
   - A. Patients having markedly advanced neoplastic disease with expected lymphatic destruction.
   - B. Patients having undergone previous surgery interrupting the lymphatic system.
   - C. Patients having had deep radiation therapy to the examined area.

In those cases in which extreme caution should be exercised, lymphography is still necessary, a smaller dose of oil contrast medium with protected injection time with less pressure and careful monitoring is required.

3. Cell lysis should be done on all patients before submitting them to lymphography. Be aware of possible extrinsic sensitivity to local anesthetic and skin dermographism. Careful history taking is important.

4. The technique of cannulation: extravasation to be avoided and/or detected early. The injection site should be included on the “oral” film or observed under image intensification fluoroscopy. The needle tip must remain visible in the incision wound.

5. Only contrast material once opened, ampules should be discarded. Ampules of Ethiodol should not be used. If the color has degraded to a particular matter in present. The dosage for pediatric patients should be determined with great care. The dose for children should be determined by careful monitoring. It should stay below 0.25 mL/kg.

6. Injection pressure should be regulated to deliver the average dose in less than 15 minutes. Continuous monitoring helps to determine the speed most appropriate for each individual.

7. For lymphography: lymphangiography may be used for monitoring, they should be developed and viewed immediately in order to collectative measure when needed, e.g., discrimination of the study of the lymphatic, lymphangiography, lymphovascular, etc. Reducing injection speed in vessels of collateral circulation occurs. If this higher venous radiographic dose is not capable of the usual injection pressure. This is highly suggestive of lymphatic obstruction. Doped lymphangiography should be taken more frequently in such cases.

8. Surgical technique: strict aseptic technique is followed including the wearing of a face mask. Before suturing, the removed or lymphatic vessel and loose tissue are removed and the wound well washed with saline to remove, if possible, any in case of reflux type lymphomas, the cannulated large lymphatic vessels may have to be closed by catgut to avoid development of a lymphocele.

**BIBLIOGRAPHY**

4. Vomitoro, M. A., University of Miami, Jackson Memorial Hospital, Miami, Florida, Private Communication.

A development of Guelda Laboratories  

**DESCRIPTION:**

Ethiodol (ethiodized oil for injection) is supplied in a box of two 10 mL ampules NDC 0281-7062-37.

Store at controlled room temperature 50°-30°C (95°-86°F). Protect from light. Remove from carton only upon use.

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whichever solution and container permit. Ethiodol should be ethiodized oil for injection at room temperature under normal conditions. (See DESCRIPTION.)

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