PHIL

Precipitating Hydrophobic Injectable Liquid (PHIL) is a non-adhesive liquid embolic agent utilized in endovascular procedures to occlude blood vessels, particularly in the treatment of cerebral arteriovenous malformations (AVMs) and dural arteriovenous fistulas (DAVFs). It is composed of a copolymer dissolved in dimethyl sulfoxide (DMSO), with an iodine component covalently bonded to the copolymer to provide radiopacity.

Properties and Composition:

- **Copolymer:** The copolymer is a non-adhesive hydrophobic polymer that precipitates upon contact with blood, forming a solid embolus. - **Dimethyl Sulfoxide (DMSO):** Serves as a solvent, allowing the copolymer to remain in a liquid state until injection. - **Iodine Component:** Covalently bonded to the copolymer, providing radiopacity for fluoroscopic visualization during procedures.

Clinical Applications:

PHIL is primarily used in the embolization of cerebral AVMs and DAVFs. Its non-adhesive nature reduces the risk of microcatheter entrapment, a common complication associated with other embolic agents like cyanoacrylates. Additionally, PHIL's formulation allows for controlled and predictable solidification, which is crucial for effective embolization.

Safety and Efficacy:

Studies have demonstrated that PHIL is both safe and effective for the endovascular treatment of cerebral AVMs and DAVFs. A systematic review and meta-analysis reported a complete occlusion rate of 32% for cAVMs and 91% for dAVFs, with low complication rates. Another study indicated that PHIL is a safe and effective liquid embolic in peripheral embolizations, both in elective and emergent scenarios.

Advantages:

- **Non-Adhesive Nature:** Minimizes the risk of microcatheter entrapment. - **Controlled Solidification:** Allows for predictable embolization outcomes. - **Enhanced Radiopacity:** Facilitates precise visualization during procedures. - **Reduced Imaging Artifacts:** PHIL produces less glare artifact on computed tomography (CT) imaging compared to other embolic agents like Onyx, aiding in post-procedural assessment.

Considerations:

While PHIL offers several advantages, it is essential for clinicians to be aware of potential challenges, such as the need for DMSO-compatible microcatheters and the possibility of early distal embolization. Careful patient selection and procedural planning are crucial to mitigate these risks.

In summary, PHIL represents a significant advancement in liquid embolic agents, providing a safer and more effective option for the endovascular treatment of cerebral AVMs and DAVFs.