Ultrasonic Chest Tube

Published date: Oct. 30, 2018

Technology description

The Ultrasonic Chest Tube is a novel solution for improving the continuous drainage of effusions in the pleural space around the lungs. By incorporating an ultrasonic delivery catheter into a chest tube, the invention improves the efficiency, speed, and outcomes associated with the drainage of pleural effusions.

Background:

A chest tube is required for drainage of excess of fluid accumulation around the lungs inside the chest wall (pleural effusion). The excess fluids can be caused by injury, infection, heart failure, or other diseases. The most common pleural effusions are hemothorax (blood), empyema (pus), and malignancy.

Treatment for loculated pleural effusions (fixed, isolated pockets) is typically thoracentesis - drainage of the pleural space via puncture through the skin with a percutaneous catheter or a surgical chest tube. Doctors can also administer intrapleural fibrinolytic agents to disrupt the clot formation, thus causing the clot to dissolve and drain more easily. If these treatments fail, the risk of epyema increases, particularly when blood remains resulting in a retained hemothorax. The final therapeutic option is an invasive surgical procedure, Video-Assisted Thoracic Surgery (VATS).

The use of fibrinolytic agents and thoracentesis is not without controversy. Specifically, if the chest tube and fibrinolytic agents are unsuccessful, then surgical intervention will be delayed. A delay of treatment can significantly impact the outcome of the patient. Additionally, fibrinolytic agents have an increased risk of hemorrhage.

The invention employs both mechanical (ultrasonic chest tube) and chemical (fibrinolytic agents) means simultaneously to disintegrate the clots and drain the fluid in the pleural cavity quickly.

Application area

This invention is broadly applicable to surgeries within the abdominal cavity.

Advantages

It addresses the following concerns, which have not been adequately addressed by the devices and therapeutics on the market:
Decreasing treatment time for difficult to treat cases by using ultrasound and fibrinolytic agents to dissolve clots
Increasing efficiency with combined mechanical and chemical processes may allow lower concentrations of fibrinolytic agents to be used, thus reducing the risk of hemorrhages
Non-surgical interventions could reduce the overall cost of treatment up to $60,000 per patient who currently require VATS

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