Modified Veress Needle for Tension Pneumothorax Decompression

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Technology description

Invention:
Inventors at the University of Arizona have developed a Modified Veress Needle (mVN) that has several design and functional advantages compared to the 14-gauge needle thoracostomy (NT) for treating tPTX, including an indicator element to know the position of the needle. The inventors demonstrated the effectiveness of their design through a cross-over swine model of 43 tPTX events in which mVN resulted in 100% successful decompression within 70±86seconds and NT resulted in 21% successful decompression within 157±96seconds.
Background:
Tension pneumothorax (tPTX) is a life-threatening condition that is present in 0.2-1.7% of civilian trauma patients and up to 4% of battlefield casualties. It results from laceration to the lung, creating a parenchymal air leak with no means of evacuation. Consequently, the patient manifests with severe hypoxia, hypercarbia and cardiovascular collapse as increasing pressure in the hemithorax creates ipsilateral lung collapse and impedance of venous return to the heart. Current standard pre-hospital treatment of tPTX, as described in the 9th edition of the Advance Trauma Life Support Student Course manual, is immediate decompression by inserting a large caliber needle, 5cm 14-gauge angiocatheter, into the second intercostal space of the effected hemithorax. This technique has failure rates ranging from 40-64%. In 1938, Veress developed a needle with a spring-loaded obturator that allowed safe insertion and insufflation of the peritoneal cavity. Thereafter, pneumoperitoneum was established prior to instrumentation of the abdomen.

Application area

• Medical

Advantages

• Longer needle length
• Large bore diameter
• Tactile and visual feedback of parietal pleura penetration

• Needle is protected once device is in throrax
• No use of plastic sheaths, therefore avoids kinking
• Ability to pass a wire through the mVN to guide in pigtail catheter placement

Institution

University of Arizona

Inventors

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