Specialized in Minimally-invasive Radio Frequency Plasma Technology for Spine Surgery
Minimally-invasive

Shorter Procedure Time

Reduced Tissue Damage

Less Patient Pain

Faster Recovery

Intradiscal Decompression

RF Ablation Electrode

Bipolar RF Ablation Electrode provides accurate and effective surgical procedure with excellent clinical outcome.

Designed for contained disc herniations.

A surgical procedure of safe, rapid and effective performances.

An innovative and minimally-invasive surgical solution for discogenic diseases.

Minimally-invasive approach to achieve disc decompression.

Out-patient procedure.

Vaporization of nucleus tissues in a controlled low temperature.

Receive tactile feedback from patients.

Precise disc compression of inter-vertebral disc.

Precise tissue removal with minimal damage to surrounding tissue and effective Disc Compression.

Quick relief of back pain, improving life quality and early return to normal activities.

Local anesthesia, standard discography approach, easy and simple operation.

Minimally-invasive and safe procedure, with low risk and little complications.

Excellent surgical outcomes.
Study of Effectiveness of Nucleus-plasty by Plasma Ablation

Effective Decompression

Effective decompression is achieved by plasma ablation of disc nucleus. The number of ablative channels is determined according to experimental data to achieve the effective and safe disc decompression by plasma ablation. This procedure achieves quick drop of intradiscal pressure.

Low-temperature Ablation

Temperature by plasma ablation is controllable through the whole degrees Celsius, making the ablation temperature controllable within the scope of the 70 degrees Celsius, making the ablation temperature controllable through the whole scope of the Nucleus-plasty surgery.

Mineral Tissue Damage, Safe & Controllable

The approach of plasma ablation obviously improves the internal chemical environment caused by inter-vertebral disc degeneration and reduces synthesis of repair factors, which is advantageous to the local repair.

Different from the traditional way, which destroys tissue successively by high temperature heat shrinkage technology, the approach of plasma ablation can control temperature at inter-vertebral disc with a mean 180 degrees for 10 ~ 15 seconds to completely ablate the process. It’s a second ablation at the same interval is needed, firstly removes the coupling of electrode and puncture needle and emit the electrode by 1 mm to make the electrode tip back into the needle, around the needle body by 3 ~ 5 mm, then coupling electrode at the puncture needle end. To complete another ablation process by using the same way as above.

After ablation, remove coupling, withdrawn the electrode, and pull out the needle. Control the skin with band-aid after pulling out the needle. Neck collar fixed for a week.

The edges of ablation channel were very clean and no tissue damage, with the slight anamol and end joint intact.

Nucleus volume reduction / ablation by channeling numbers. The approach of plasma ablation can control tissue-ablation function, meanwhile with no obvious thermothermal damage.

Tissues Regain Vitality After Ablation, Effective Pain Relief

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Ablation

Set the generator output to gear 2 (125 VEMS, step of 0.6 A) for half a second to test the reaction of the patients and make sure there is no exception reaction. If any stimulus symptoms happen, the surgeon should stop the puncture process, and wait for other patients to be operated.

Attention

For patients diagnosed under MRI to be multiple segmented cervical inter-vertebral disc herniation, doctors should carefully set the target segment operation at a time. For patients who mainly have arm numbness and pain due to cervical segmental cervical inter-vertebral disc herniation, doctors should carefully set the target segment operation at a time.
Local Anesthesia

Puncture Location

a) Key Point of Puncture:

- **Entopic needle**: Positioned at the medial edge of the vertebral pedicle.
- **Lateral Needle**: Positioned at the lateral 1/3-1/4 of the vertebral pedicle.

Location

Using Kirschner wire to locate lesion interval under fluoroscope in prone position, and mark it on the body surface.

Choosing Puncture Point

- The point at 8-10CM away from the spine mid-line and parallel with inter-vertebral space.
- Under guidance of CT, insert the special puncture needle into the inter-vertebral disc through the point of 6-10CM away from the spine mid-line and parallel with inter-vertebral space, where it’s called the safe triangle area. Keep the needle at a 35-45 degree angle with skin.
- The puncture needle tip should be located at the border of annulus fibrosus and nucleus.
- Entopic needle is positioned at the medial edge of the vertebral pedicle.
- Lateral Needle is positioned at the lateral 1/3-1/4 of the vertebral pedicle.

Equipment

- C-arm CT
- Plasma Surgical System
- Plasma Electrode
- Puncture Needle/Trocar Needle

Key Points in Lumber Surgical Operations

- **Position**: Prone Position
- **Location**: Using Kirschner wire to locate lesion interval under fluoroscope in prone position, and mark it on the body surface.

Ablation

Under monitor of C-arm CT, set the generator to Gear 2 (125Vrms), step on the ABLATE pedal of the foot switch, push the electrode slowly to the distal point for decompression operation, and then step on the Coagulation pedal, meanwhile retreat the electrode by the same route at the speed of 5mm/Sec, thus the ablation and coagulation in one direction is finished.

Patient Selection (Indications)

- Patients under age of 50, with course of disease less than 5 years.
- No effect or little effect from conservative treatment, and not open to open surgery.
- Patients suffering from lumbago from long-time sitting or standing with radiating pain of hip or low extremities, with main symptoms of nerve root stimulation related to inter-vertebral disc pressure.
- Height of inter-vertebral disc > 75%.
- MRI: diagnosis to be IDD DDD contained herniated disc.
- Discography Positive.

Attention

Keep the puncture needle parallel with inter-vertebral space. Patients may feel lumber pain when puncture needle reaches the annulus fibrosus. If any radiating pain happens at lower extremities, stop the puncture immediately, change the puncture position and re-puncture. Repeated and multi-times puncture at L5-S1 is not recommended. Waist soreness or mild pain is normal reaction during surgery.
How It Works

ABLATE
The Radio Frequency energy flows through active electrode and return electrode, and by the conductive saline solution it generates precisely focused plasma sheath around the electrodes. The plasma sheath consists of massive charged particles which can generate sufficient energy of strong oxidizing when accelerated by the electric field. The generated energy is powerful enough to break the organic molecular bonds within the tissue, and make the tissue rapidly dissolved into molecular and atoms level at a relatively low temperature of 40-70˚C. The device provides rapid and efficient ablation and resection capabilities of soft tissues in a relatively low temperature.

COAGULATE
When RF energy acts on tissue (including blood), around the electrode tip it generates Joule heat and electromagnetic wave effect which providing an immediate coagulation of tissue protein and sealing of small blood vessels, thus coagulation and hemostasis capabilities of target tissues are realized. The surgical process by plasma ablation creates well-distributed coagulative necrosis for efficient hemostasis while preserving the mucosa and fibrous tissue. Compared to that of conventional surgical methods, its post-operative recovery is improved. Different from the past thermal coagulation by high temperature, plasma technology can make the working temperature controlled at 40-70˚C, and coagulate helical structure of collagen molecules meanwhile preserving the cells vitality.

Excellent Performance

Systematic Working Mode
Two working modes:
ABLATE for resection and ablation activated at Yellow control panel and Yellow foot pedal.
COAG for coagulation and hemostasis activated at Blue control panel and Blue foot pedal.

Precise Working Control System
Standard inter-vertebral disc radiography access, particular plasma surgical electrode with diameter less than 1mm. Gasify nucleus pulposus tissue within the range of 70 degree Celsius, with energy penetration depth controlled within 20um, forming an effective inter-vertebral disc decompression and nucleus-plasty.

Intelligent Control System
Designed with automatic identification of electrode, foot switch and power cord, displayed respectively on the device control panel, and automatic default power output value for different electrode designs.

Automatic Protection
The electrical circuit system in ARS 800 controller can constantly monitor power output and automatically suspend power output when there is instantaneous peak current. For example, the controller will automatically suspend radio frequency output when electrode contacts or is close to metal, and automatically resumes work after electrode has returned to a proper distance.

Temperature Control Technology
The surgical process by plasma technology is performed at controlled 40-70˚C. It uses a controlled, non-heat driven process in which bipolar radiofrequency (RF) energy excites the electrolytes in a conductive medium, usually saline solution, to create a precisely focused and charged plasma gas. The energized particles in the plasma have sufficient energy to break the organic molecular bonds within tissue, causing tissue to dissolve at relatively low temperatures of 40-70˚C. Radiofrequency current does not pass directly through tissues, causing minimal tissue thermal effect. By temperature control technology, it automatically optimizes output value according to the plasma layer status around the electrode tip and the target tissue feature, by which electrode can provide a stable and efficient capabilities while keeping the lowest working temperature.

Bipolar and Multi-polar Technology
Various bipolar and multipolar electrode designs are available. Around the electrode tip, sufficient and stable plasma layer is generated for rapid resection, ablation, coagulation and hemostasis of soft tissues.

Integrated Function
In one versatile single-use electrode, it provides ABLATE for resection and ablation, and COAG for coagulation and hemostasis.

Foot Switch
The water-proof, pressure-resistant and convenient foot control has two working modes of ABLATE and COAG, each identified in different colors and working sounds.