VAPR™ T
Thermal Electrode

Design of Tip Electrodes for Arthroscopic Radiofrequency Devices

Tip Embedded Sensors Can Underestimate Tissue Temperature

Figure 1
Monopolar Probe Design

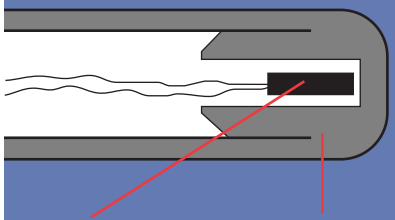
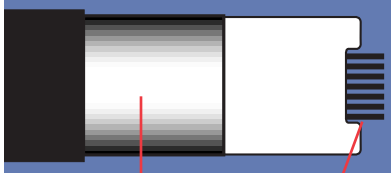


Figure 2
VAPR-T Bipolar Electrode Design



It is difficult, if not impossible, to accurately measure tissue temperature using an arthroscopic probe with a tip-embedded temperature sensor (Figure 1). This approach can underestimate tissue temperature for reasons illustrated below:

- Because a tip embedded temperature sensor is not in direct contact with tissue, it measures the temperature of the metal tip electrode. The cooling action of the irrigation fluid can cause the tip electrode to be cooler than the tissue itself. This is the fundamental limitation of probe designs that measure "tip electrode temperature" rather than measuring "tissue temperature."

- The second major difficulty in accurately measuring tissue temperature results from the fact that the highest tissue temperature may actually occur below the surface of the tissue. This results from the cooling action of the irrigation fluid which lowers the temperature of the tissue surface in contact with the tip electrode.

Mitek has chosen to minimize these issues by utilizing a *bipolar* tip design, shown in Figure 2, which dynamically controls power to the tissue in response to thermal changes at the tissue/electrode interface. As a result, the controlled output power is not adversely influenced by fluctuations in tip electrode temperature.

Additionally, because the Mitek VAPR™ System utilizes bipolar tip technology, the depth of thermal tissue modification is less than monopolar devices*, providing an additional measure of patient safety.

* Laboratory for Comparative Orthopedic Research, Michigan State University. Data on file at Mitek.

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