

# The application of ferromagnetic dissection in neurosurgery: A preliminary study

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## Introduction :

We report our initial experience with the FM wand, a new tissue dissection technique using ferromagnetic energy. It differs from electrosurgery in that radio frequency (RF) current never passes into tissue. Instead, it couples to a layer of ferromagnetic alloy coating on the instrument tip, achieving a pure thermal surface effect. As a result, there is no electrostimulation and a very shallow tissue injury.

## The Principle:

The FM wand generator delivers a high frequency electrical current to the surgical hand piece which is coated with 10 micron thick ferromagnetic alloy, producing a rapidly alternating magnetic field. The ferromagnetic alloy at the tip of the FM wand reacts to the rapidly changing magnetic field and generates pure thermal energy. When the hand piece is deactivated, the tip rapidly cools. The alternating electrical current completes its return to ground back through the hand piece and generator. No electrical current passes through the patient and no grounding pad is necessary.

## Methods:

We used the FM wand for tissue dissection in 12 patients with a variety of cranial and spinal neurosurgical procedures. The instrument was used as a supplement to standard monopolar cautery and predominantly in close proximity to the neural and vascular structures. During the resection of intracranial meningiomas, it was used as an alternative to the cutting loop of the monopolar cautery.

## Results:

Age: 2-65 yrs (3 Pediatric age group)

Procedures:

Chiari malformation with syrinx: 3

Intraspinal Tumor: 2

Intraspinal tumors with Tethered cord: 2

Recurrent Lumbar disc prolapse: 2

Intracranial meningioma: 2

Recurrent Glioblastoma: 1

Simultaneous intraoperative evoked potential monitoring: 9



The FM Wand generator and the hand piece (Courtesy : Domain Surgical Inc)



Various tips for the FM Wand (Courtesy: Domain Surgical Inc.)



Intraoperative photograph of a foramen magnum meningioma resected with FM wand

## Observations:

1. The FM wand was effective in dissecting the scar tissue in close proximity to neural structures and dural tube especially during the reoperations.
2. In patients with meningioma it was predominantly used as a cutting loop and was able to dissect the tumor safely out of its close proximity to intracranial vessels.
3. While slower than monopolar, there was no interference with evoked potential monitoring during continuous dissection with the FM wand.
4. There was no spark.
5. Tissue desiccation or char effects were comparatively minimal. There was no muscle stimulation.

## Conclusions:

Though the FM wand can be used as an alternative to conventional monopolar dissection, the authors believe that its greatest use lies in dissecting critical neurovascular planes or intradural scarring in close proximity due to its much shallower thermal margins of injury compared to RF.

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