



Xi'an consensus on magnetic surgery

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The interest in magnetic surgery has increased over the past decade following the development of minimally invasive procedures.

Magnetic surgery is defined as surgical treatment by utilization of magnetic technology.

Specifically, magnetic surgery includes but is not limited to magnetic compression anastomosis (Magnamosis), magnetic anchoring technique, magnetic navigation technique, magnetic sphincter augmentation, self-assembling magnets for endoscopic intestinal bypass, magnetic compression ostomy, correction of congenital deformities, etc. Magnetic surgery is developing rapidly and created a new surgical field.

The advantages of magnetic compression anastomosis include:

- (I) Non-penetrating compression anastomosis, minimizing inflammatory reaction;
- (II) Incision-less and suture-less anastomosis;

- (III) Easily applied to minimally-invasion procedures;
- (IV) Self-assembling for creation of anastomosis;
- (V) Self-adjusting according to individual tissue thickness.

The disadvantages of magnetic compression anastomosis include:

- (I) MRI inspection is limited;
- (II) Application may be limited patients with pacemakers;
- (III) Magnetic force is difficult to be precisely controlled;
- (IV) Possible side effects of long-term exposure to magnetic field (as yet unknown).

The principle of Magnamosis of hollow viscus is based on the natural process of tissue remodeling and healing. A constant pressure is exerted on the apposed walls of two visceral segments by magnetic devices leading to transmural ischemia, necrosis, and healing with, finally,

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full-thickness anastomosis between the segments. There must be enough compressive force to cause ischemia with central necrosis such that a new channel is formed rather than an ulcer or fistula. Compression pressure should be controlled so that the surrounding tissue has time to remodel and form a competent ring around the new anastomosis channel.

There are several difficulties in magnetic surgery, such as safety in clinical application, coating with biocompatible materials, self-assembling, device expulsion, limited MRI use, etc.

Aware of these difficulties, we hold this meeting to discuss these problems, to formulate the main principles of magnetic surgery, to establish a worldwide network of magnetic surgical researchers, to provide guidelines for clinical application of magnetic surgery, and to promote the development of Magnetic Surgery.

The following issues have been attained and are supported by the experts:

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- (I) Regular international meetings should be held worldwide.
- (II) Magnetic Surgery Alliance (MSA) should be established for clinical and experimental research.
- (III) A book "Magnetic Surgery" discussing the latest progression and perspective of magnetic surgery should be drafted and published.

To promote the development of Magnetic Surgery, we sincerely invite physicians, nurses, scientists, and industry to join the Magnetic Surgery Alliance.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.