



***MECHATRONIC
APPLICATION IN
NEUROSURGERY***

by

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keyhole neurosurgery

Needles and catheters are inserted into the brain through the tiny hole for:

Biopsy and therapy, including blood/fluid sampling. ◎

Tissue biopsy. ◎

Ablation. ◎

Brachytherapy. (internal radiotherapy) ◎

Deep brain stimulation (DBS). ◎

Diagnostic imaging. ◎

Neurosurgical Robot History

- 1- *NeuroMate*(1987- USA): the first neurorobotic device. {errors when the brain is shifted}
- 2- *Minerva* (1991- Switzerland): the first system to provide image guidance in real-time.
{limited ;perform single dimension incursion}
- 3- *Robot-Assisted Microsurgery System* (1995- Washington): the first robotic system.
{brain is best visualized with MRI}
- 4- *NeuroBot* (2002-Japan): the first telecontrolled system through (3D) endoscope.
{removed a tumor from a patient, more accurate & less invasive}

5- current system The most important advantages

The ability to perform (microsurgery). ⊙

High accuracy (stereotactic surgery). (3 dimension) ⊙

Access to small corridors (minimally invasive ⊙
surgery).

The ability to process large amounts of data (image- ⊙

guided surgery).

The ability for telesurgery. ⊙

Deduce the surgeon's physiological tremor. This is ⊙
particularly important to the brain because all the
tissue of the organ is very delicate and of
importance.

Treatments

Related pathologies are

- (اورام) Tumors. ✓
- (الإستسقاء) Hydrocephalus. ✓
- (خلل التوتر العضلي) Dystonia. ✓
- Essential tremor ✓
& Parkinson's Disease.
- (الم الطرف الوهمي) Phantom limb pain. ✓
- (صداع عنقودي) Cluster headache ✓
- (صرع) Epilepsy. ✓

Challenges

Up to now many robotic systems, usually tele-controlled, have not been accepted in the operating rooms. The reasons are that they did not give enough advantages to the users with respect to the inherent **disadvantages**:

- 1- high cost,
- 2- the long time required for setting up,
- 3- the huge size, and
- 4- the poor integration within the standard instrumentation present in the operating room.

جراح صيني يزيل المرارة لامرأة تبلغ من العمر 30 عاما في أقصى غرب الصين لتكون أول شخص يستأصل المرارة عن بعد، حيث كانت المريضة تبعد عن الجراح بأكثر من 4500 و 5 كم، وباستخدام تقنية الروبوت .. وقد استغرقت العملية حوالي نصف ساعة .. هذا لأول مرة في التاريخ وفي الصين



THANKS