MR-BASED MEASUREMENT OF SPINAL CORD MOTION DURING FLEXION OF THE SPINE: IMPLICATIONS FOR INTRADURAL SPINAL CORD STIMULATOR SYSTEMS

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EPIDURAL SPINAL CORD STIMULATION

- FDA approved in 1989

- Problems with placement in the epidural space:
  - Lead migration
  - Distance to spinal cord
  - Various electrical substrates
  - CSF shunting
FIRST INTRADURAL STIMULATOR - 1967

- Initial problems not with electrode but with subarachnoid space placement:
  - Direct compression of the spinal cord producing paraplegia
  - CSF Leaks
  - Secondary meningitis
  - Progressive arachnoiditis

Electrical Inhibition of Pain by Stimulation of the Dorsal Columns:

Preliminary Clinical Report

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James B. Reswick, D.Sc.‡

LONG-TERM stimulation of the dorsal columns has been proposed recently as a potential method for relief of pain.† Acute electrophysiological and chronic behavioral studies in animals suggested the possibility of this method. Further experimental studies confirmed its potential safety and have thus led to application in patients.

REPORT OF A CASE
A 70-year-old man was admitted to Lutheran Hospital in early March because of severe diffuse pain in the right lower part of the chest and the upper part of the abdomen. He had previously been demonstrated to have inoperable bronchiogenic carcinoma and was suspected of having post

Anesthesia and Analgesia, July-Aug 1967
THE IOWA PATCH
PLACING THE PATCH
IMAGING OF IMPLANTED IOWA PATCH
WHAT DOES THE SPINAL CORD DO WITH FLEXION?
MR APPROACH
MAKING MEASUREMENTS

- Pedicles
- DREZ to DREZ Distance
- DREZ to Pedicle Distance
- Dural Exit of Spinal Nerves
- Spinal Nerves
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Cranial/caudal movement of cord at T11

Expansion/Contraction of T11 cord segment
THANK YOU!
VOLUNTEER POSITIONING IN SIEMENS TRIO MR

- Neutral
- Maximal Flexion
ANCIENT GREEKS

- Multiple writings of electric rays and eels used as anesthetic during early operations and childbirth

- Greek word for ray is “narke” …from which our “narcotic” is derived

http://www.elasmo-research.org/education/shark_profiles/torpediniformes.htm
19th Century

- "Faradization" being performed on a subject using a direct current inductorium device

1872 Medical Textbook

1882 Boston Globe Advertisement
20th Century

"Electreat" TENS device patented 1919 and made in Peoria, Illinois. Operates on 2 D batteries.

21st Century
FIRST, SOME HISTORY

- Scribonius Largus
  - Physician under Roman emperor Claudius
  - Wrote Compositiones Medicae in 46 AD
  - Described use of torpedo fish to treat the pain of headaches and gout

1965 GATE CONTROL THEORY
MELZACK AND WALLS

http://www.burtonreport.com/infspine/NSPainTheories.htm