SPINE SURGERY

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‘I Come In Peace’

Spinal Surgery : Pathology

- Congenital
  - Downs syndrome, Klippel Weil
- Degenerative
  - Cx Spondylosis
  - Lx Spondylosis
- Inflammatory
  - Rheumatoid arthritis
  - Ankylosing spondylitis
- Trauma
  - Falls
  - RTA
- Neoplastic
  - Benign
  - Malignant
- Infective
  - Tuberculosis
  - Bacterial

Spinal Surgery : Why do we operate ?

- Pain
- Neurological deficit
  - Spinal cord
  - Nerve root

INDICATIONS

- Compression

  Decompression
  - Anterior
  - Posterior
- Instability

  Fusion
  - Bone
  - Instrumentation
  - Recombinant bone morphogenetic protein

BACK PAIN

Back pain : Statistics

- GP consultations 14,000,000
- Hospital OP 1,600,000
- Xrays 1,500,000
- NHS physio 1,000,000
- Osteo / Chiro 700,000
- Admissions 100,000
- Operations 24,000
- Cost to BUPA £?000,000.00!

Back pain : Economics

- Annual cost to NHS : £480,000,000
- Lost production : £3,800,000,000
- DHS Benefit paid : £1,400,000,000
- Total cost:

£5,680,000,000

Acute LBP : Causes

- Degenerative
  - Musculo - ligamentous, discogenic, facet joint, osteoporosis
- Trauma
- Tumour
  - Intra / extradural, pathological #
- Infection
  - Pyogenic, TB, discitis, osteomyelitis
- Inflammatory
- Vascular
  - Aortic aneurysm

Diagnostic Triage
Simple Backache

- Presentation between ages 20 – 55
- Lumbosacral region : buttocks and thighs
- Mechanical pain
  - Varies with physical activity
  - Varies with time
- Patient well
- Prognosis
  - 90 % recover from acute episode in 6/52
  - Significant recurrence rate

Common indicators from history and examination to cause concern

History

- Age
  - < 18yrs, > 55yrs
- History of trauma
- Pain
  - Radicular, noturnal unremitting
- Weight loss, Fever
- PMH
  - Carcinoma
  - Immunosuppression
    - HIV
  - Systemic illness
    - Rheumatoid Arthritis
    - Ulcerative colitis
- D.H
  - Steroid therapy

Examination

- Spine
  - Structural Deformity
  - Pain in motion
- Neurological
  - Myeloradiculopathy
    - UMN / LMN
    - Sphincter disturbance
    - Gait disturbance
- Peripheral
    - Skin rash
    - Iritis

Examples of different methods for treatment of back pain

- Acupuncture
- Anthroposophic medicine
- Back school
- Balneotherapy
- Bed rest
- Behavioural therapy
- Body awareness therapy
- Biofeedback
- Cardiovascular fitness training
- Chiropracter
- Connective tissue massage
- Corsets
- Crutches
- Cupping
- Diet
- Disc injections
- Electrotherapy
- Epidural anaesthesia
- Exercises
- Facet blocks and denervation
- Healing
- Herbal medicine
- Holistic therapy
- Homeopathy
- Hydrotherapy
- Injections of saline, water, local anaesthetics
- Ionic modulation
- Iontophoresis
- Laser therapy
- Magnet therapy
- Manipulation
- Massage
- Medication
- Meditation
- Mobilisation
- Moxibustion
- Multimodal rehabilitation
- Nerve blocks
- Ointments
- Osteopathy
- Physiotherapy
- Relaxation techniques
- Spa treatment
- Stretching
- Surgery, various types
- Taping
- Therapeutic conversation
- Thermotherapy
- Traction
- Transcutaneous electrical nerve stimulation, high and low frequency
- Trigger point injections
- Ultrasound
- Vibrator
- X-ray therapy
- Zone therapy

Evidence based management of back pain

- Good news
  - Huge amount of literature with regards diagnosis and treatment of spinal pain
- Bad news
  - The vast majority is neither important nor valid
  - Distinct lack of RCT
  - I am afraid I don't have the answers !

Population heterogeneity

Genetics

Sex

Age

Weight

PMH

Smoking history

Occupation

Social History

- Socio - economic
- Pyschosocial

Exercise history

Expectations

Treatment modality

Outcome measures

Spinal Fusion

Indications

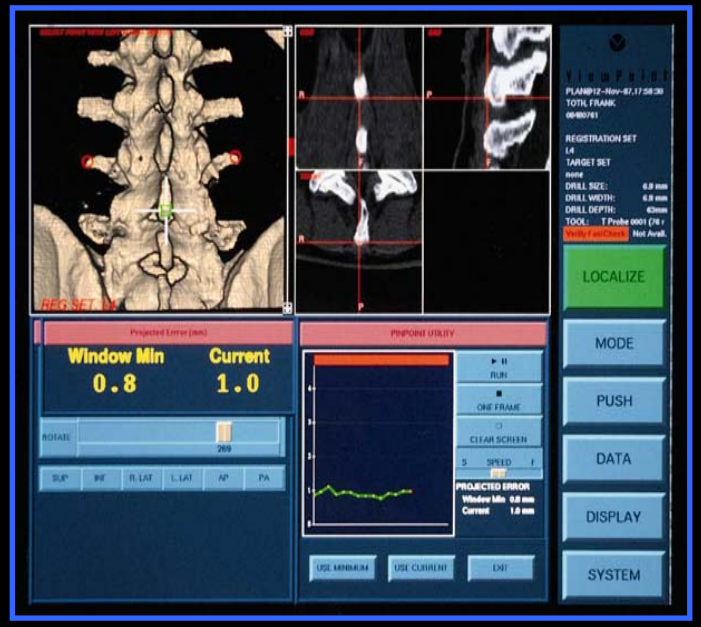
- Discogenic
- Spondylolisthesis
  - Degenerative
  - Pars interarticularis defect
- Segmental instability
  - post laminectomy
  - failed back surgery

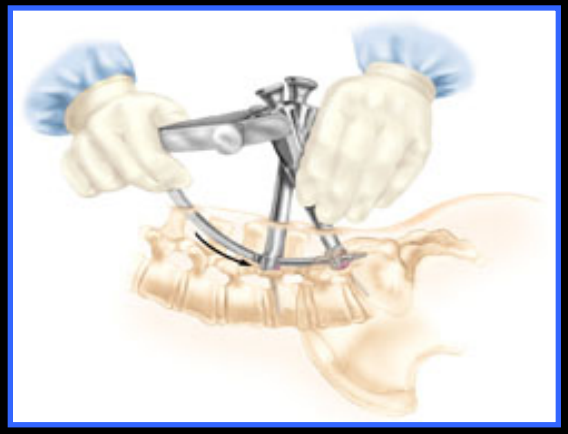
Methods

Open / Minimal access

- Posterior
  - Interbody cages
  - Transpedicular screws
  - Disc replacement
- Anterior
  - Interbody cages
  - Anterior plates
  - Disc replacement

Techniques of Spinal Fusion





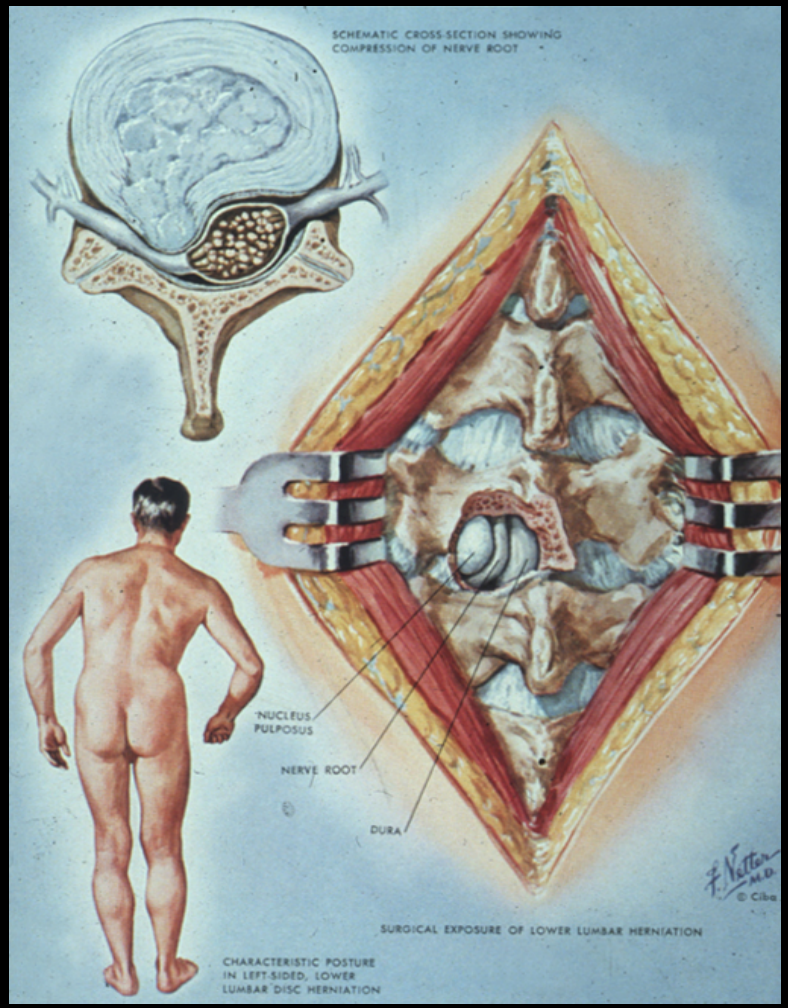
Spinal Fusion : Results

1997 Volvo Award winner in clinical studies. The effect of pedicle screw instrumentation on functional outcome and fusion rates in posterolateral lumbar spinal fusion : a prospective, randomized clinical study.

Thomsen K, Christensen F, Eiskjaer S, Hansen E, Fruensgaard S, Bunger C. Spine 1997; 22 : 2813 - 2822

- Global patients' satisfaction 82% instrumented, 74% non-instrumented (NS)
- Functional outcome (Dallas Pain Questionnaire) improved in both groups (NS)
- No difference in fusion rates
- Instrumented group significantly better in relation to daily activities if nerve root decompression undertaken
- Fixation increased operation time, blood loss, and early re-operation, and nerve root injury

SCIATICA


SCHEMATIC CROSS-SECTION SHOWING COMPRESSION OF NERVE ROOT
NUCLEUS PULPOSUS
NERVE ROOT
DURA
F. Netter M.D.
© Ciba
SURGICAL EXPOSURE OF LOWER LUMBAR HERNIATION
CHARACTERISTIC POSTURE IN LEFT-SIDED, LOWER LUMBAR DISC HERNIATION

Diagnostic Triage
Nerve root pain

- Unilateral leg pain worse than LBP
- Radiation to foot or toes
- Radicular Sx or signs
    - SLR
    - Sensory disturbance
    - Motor weakness
    - Reflex changes
- Prognosis
    - 50% improved within 6/52

Lumbar disc prolapse : Lx Microdiscectomy

(Code v3370)

Indications for surgery

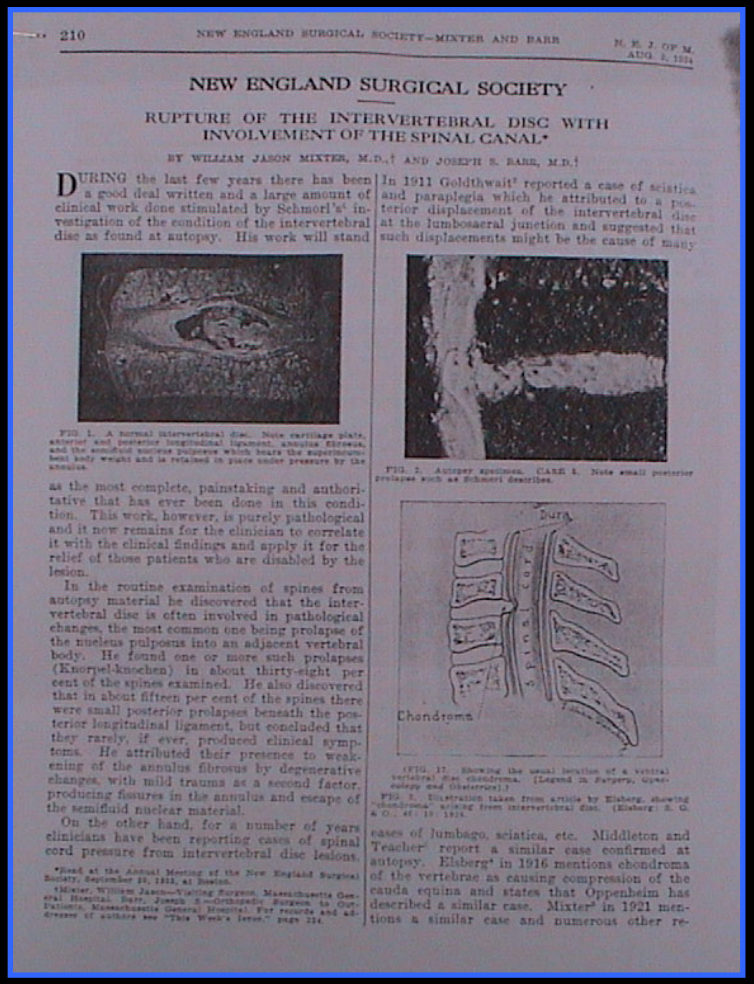
- Failure of Cx Mx
  - 85% improved within 5 – 8 weeks
  - Chronic / recurrent sciatica
- Neurological deficit
  - Cauda equina syndrome : Immediate (Rare)
    - Bilateral sciatica
    - Saddle anaesthesia
    - Sphincter disturbance
    - Motor weakness
  - Radicular : Early
- Social
  - Early surgery allows more rapid return to employment

Postoperative Management

- Mobilise same day
- Physiotherapy assessment and instruction
- Home 1 – 2 days post op
- Removal of skin clips 10 days
- Return to work dependant on occupation
- Exercise 4 – 8 weeks

Historical background

William Mixter



210 NEW ENGLAND SURGICAL SOCIETY—MIXTER AND BARR N. E. J. OF M. AUG. 3, 1916

NEW ENGLAND SURGICAL SOCIETY

RUPTURE OF THE INTERVERTEBRAL DISC WITH INVOLVEMENT OF THE SPINAL CANAL*

BY WILLIAM JASON MIXTER, M.D.,† AND JOSEPH S. BARR, M.D.†

DURING the last few years there has been a good deal written and a large amount of clinical work done stimulated by Schmorl's[6] investigation of the condition of the intervertebral disc as found at autopsy. His work will stand as the most complete, painstaking and authoritative that has ever been done in this condition. This work, however, is purely pathological and it now remains for the clinician to correlate it with the clinical findings and apply it for the relief of those patients who are disabled by the lesion.

In the routine examination of spines from autopsy material he discovered that the intervertebral disc is often involved in pathological changes, the most common one being prolapse of the nucleus pulposus into an adjacent vertebral body. He found one or more such prolapses (Knorpel-knochen) in about thirty-eight per cent of the spines examined. He also discovered that in about fifteen per cent of the spines there were small posterior prolapses beneath the posterior longitudinal ligament, but concluded that they rarely, if ever, produced clinical symptoms. He attributed their presence to weakening of the annulus fibrosus by degenerative changes, with mild trauma as a second factor, producing fissures in the annulus and escape of the semifluid nuclear material.

On the other hand, for a number of years clinicians have been reporting cases of spinal cord pressure from intervertebral disc lesions. In 1911 Goldthwait[7] reported a case of sciatica and paraplegia which he attributed to a posterior displacement of the intervertebral disc at the lumbosacral junction and suggested that such displacements might be the cause of many cases of lumbago, sciatica, etc. Middleton and Teacher[8] report a similar case confirmed at autopsy. Elsberg[9] in 1916 mentions chondroma of the vertebrae as causing compression of the cauda equina and states that Oppenheim has described a similar case. Mixter[5] in 1921 mentions a similar case and numerous other re-

FIG. 1. A normal intervertebral disc. Note cartilage plate, anterior and posterior longitudinal ligament, annulus fibrosus, and the semifluid nucleus pulposus which bears the superincumbent body weight and is retained in place under pressure by the annulus.

FIG. 2. Autopsy specimen. CASE 1. Note small posterior prolapse such as Schmorl describes.

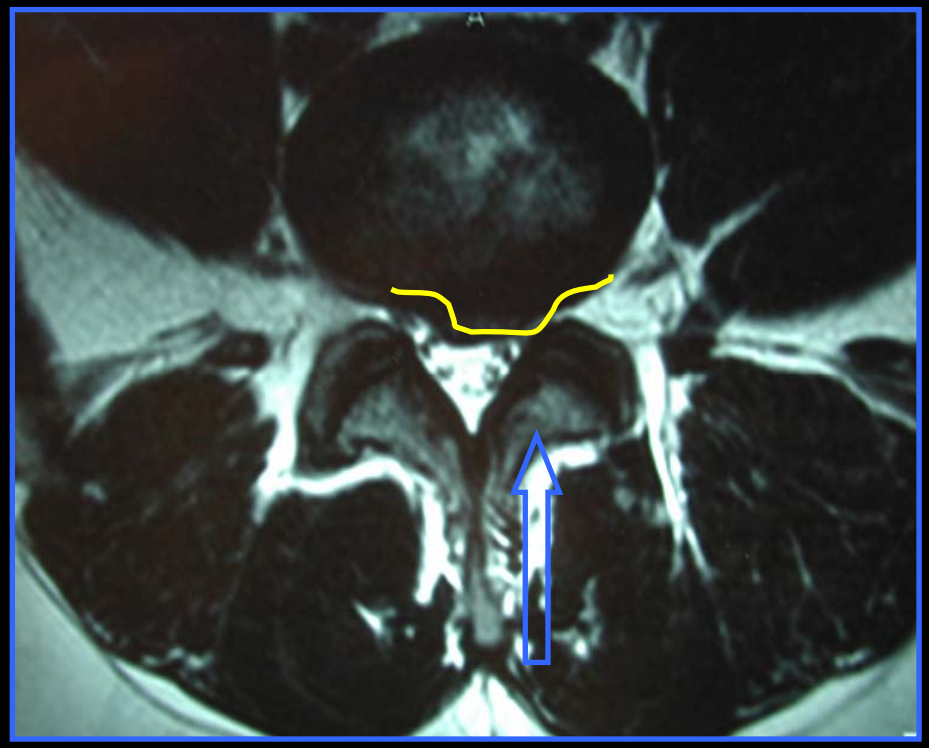
(FIG. 11. Showing the usual location of a ventral vertebral disc chondroma. (Legend in Surgery, Gynecology and Obstetrics.))

FIG. 3. Illustration taken from article by Elsberg, showing "chondroma" arising from intervertebral disc. (Elsberg: S. G. & O., xl, 19: 1925.

*Read at the Annual Meeting of the New England Surgical Society, September 30, 1915, at Boston.

†Mixter, William Jason—Visiting Surgeon, Massachusetts General Hospital. Barr, Joseph S.—Orthopedic Surgeon to Out-Patients, Massachusetts General Hospital. For records and addresses of authors see "This Week's Issue," page 114.

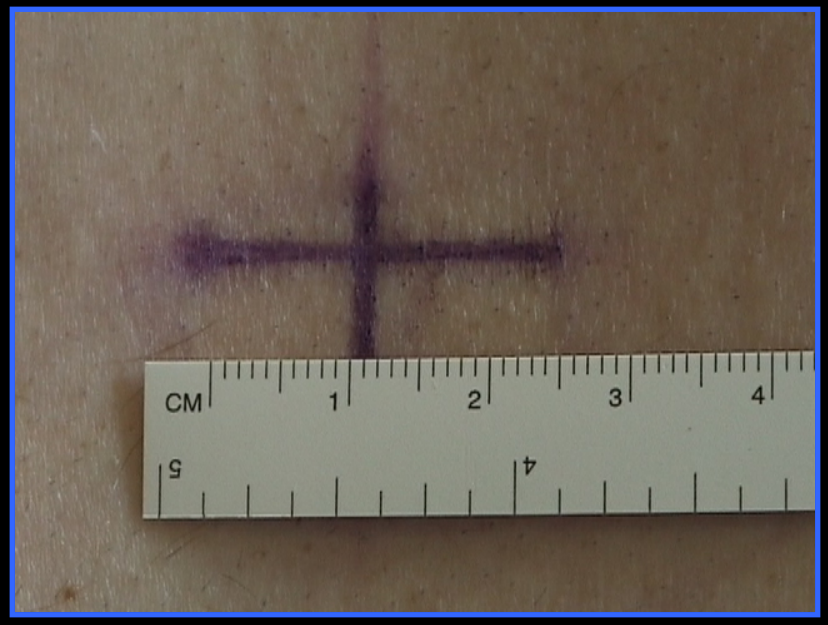
Investigations : MRI



POSITION

- Montreal / Wilson frame
- Lx Spine flexion to open interlaminar space
- Surgeon on same side as the sciatica

Incision and approach



- Midline incision
- Interspinous position
- Unilateral subperiosteal muscle strip

Lumbar Microdiscectomy
Right S1 nerve root decompression

BOTTOM

TOP

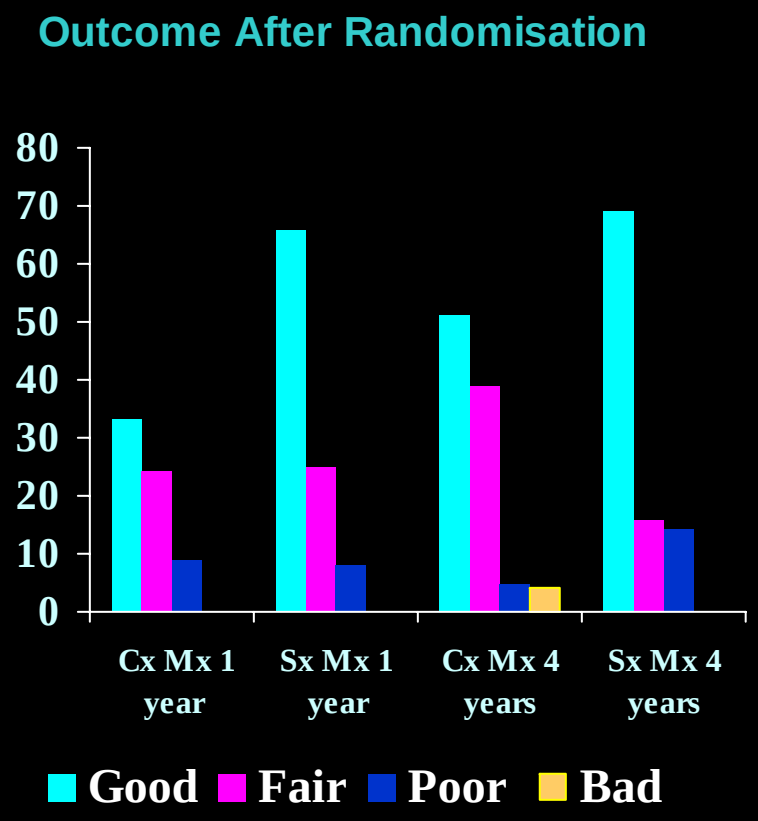
Complications

- No improvement
- Recurrence of pain
  - Recurrent disc prolapse
  - Epidural fibrosis
- Failed back surgery syndrome
- Infection
  - Disc
  - Wound
- Neural injury
- Vascular injury
- CSF fistula

LUMBAR DISC HERNIATION

A Controlled Prospective Study With Ten Years of Observation

Weber H. *Spine 8 131 –140 1983*

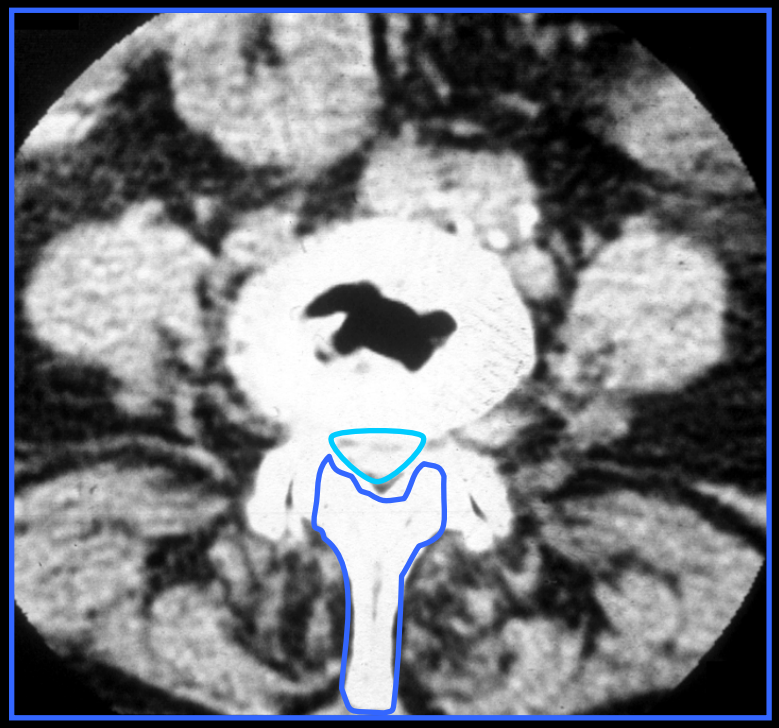


- Discectomy was significantly better than conservative therapy at one year, but no significant difference in outcome at 4 and 10 years
- Impaired motor function had a good prognosis regardless of treatment
- Sensory deficit remained in 50% of all patients

LUMBAR CANAL STENOSIS

Lumbar Canal Stenosis : Cauda Equina Compression

- Neurogenic claudication
  - radicular pain bought on by walking, cycling OK
  - Ususlly L5 / S1
    - can be uniradicular but usually bilateral
  - Pain relieved by
    - Rest
    - Lumbar flexion
  - Examination
    - Usually normal
    - Exclude peripheral vascular disease
  - Investigation
    - XR : No value
    - MRI : Diagnostic



The Cervical Spine

Mechanical neck pain

- Acute Cervical Pain < 3/12 duration
- Chronic Cervical Pain > 3/12 duration
- Causes

  Degenerative cervical spondylosis : 60 - 80% asymptomatic patients have Xray and MRI evidence of spondylosis
    - Cervical Myelopathy
    - Cervical Radiculopathy
      - Disc / osteophyte : single / multiple
      - Facet Joint
      - Musculoligamentous

  Trauma

  Tumour

  Infection

  Autoimmune
    - Rheumatoid arthritis, Ankylosing Spondylitis

Non-surgical treatment of acute neck pain

‘Numerous non-invasive treatments are used for acute and subacute neck pain. However, only a few of them have been evaluated in randomised controlled trials , and these provide little evidence that one treatment method is more effective than another’

Neck and Back pain

The Scientific evidence of Causes, Diagnosis and Treatment

Non-surgical treatment of chronic neck pain

‘Because of methodoligcal problems and lack of RCT, we believe it is not opportune to make any recommendations in favour of any type of treatment for chronic neck pain at this time - there is no clear evidence that any form of treatment studied is particularly effective for patients with chronic neck pain’

Neck and Back pain

The Scientific evidence of Causes, Diagnosis and Treatment

Management of acute neck pain

- Reassure
  - Explain the probable cause
  - Explain the natural history
    - 90% patients have Sx resolution within 2- 12/52
- Continue physical activity
- Analgesia
- Cervical orthosis
  - If severe pain for limited period
- Physical therapy
  - Chiropracter
  - Osteopathy
  - Physiotherapy

Who a neurosurgeon might want to see

- Pain with progressive or persistant myeloradicular symptoms or signs
- Failure of conservative management
- ? Infection
- ? Malignancy
- Following discussion with Neurosurgeon, Orthopaedic spinal surgeon, Rheumatologist

CERVICAL DISC PROLAPSE

Diagnostic Triage :Nerve root pain

- Unilateral radicular brachalgia
- Dermatomal sensory loss
- Motor deficit
- Loss of reflex
- Positive L’hermitte sign

Diagnostic Triage : Myelopathy

- Progressive sensory loss in limbs
- Progressive weakness in arms and legs
  - Loss of function
    - Doing up buttons
    - Gait Disturbance
- Clinical signs of myelopathy
  - Increased limb tone
  - Limb weakness, loss of sensation in spinothalamic and dorsal columns
  - Hypereflexia
  - Extensor plantar responses

Surgical Management of the Cervical spine

- Indications
  - Instability
    - Degenerative
    - Trauma
    - Tumour
  - Compression
    - Spinal cord , nerve root
    - Failure of Cx Mx
    - Progression of neurological deficit

- Operative techniques
  - Anterior approach
    - ACD + / - Fusion
    - Vertebrectomy
  - Posterior approach
    - Laminectomy
    - Laminoplasty

Cervical disc prolapse

Anterior Cervical Discectomy

Anterior Cervical Instrumentation

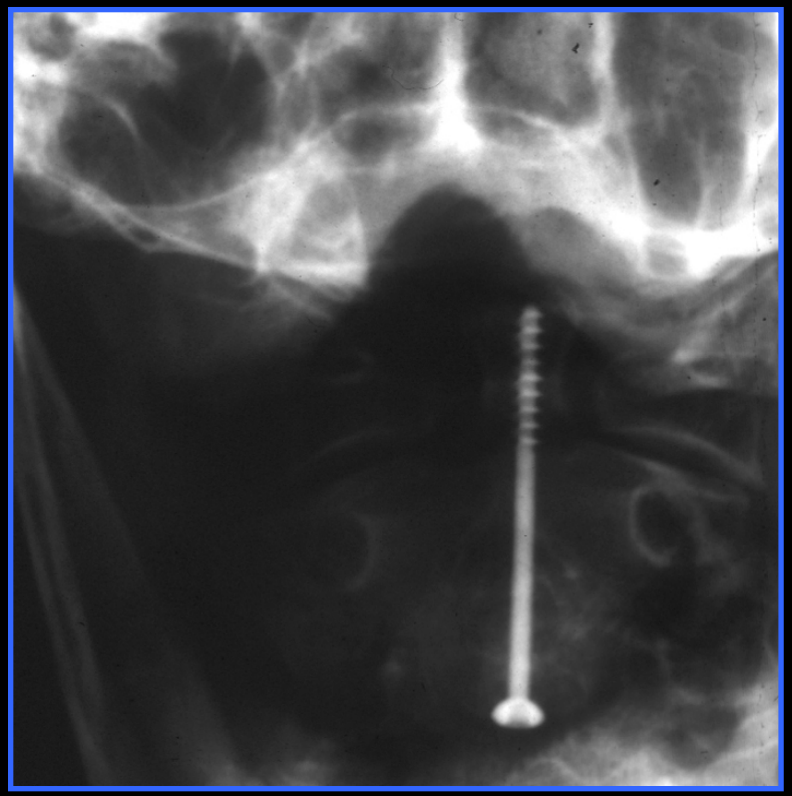
INTERBODY CAGE

ANTERIOR PLATE AND GRAFT

TRAUMA

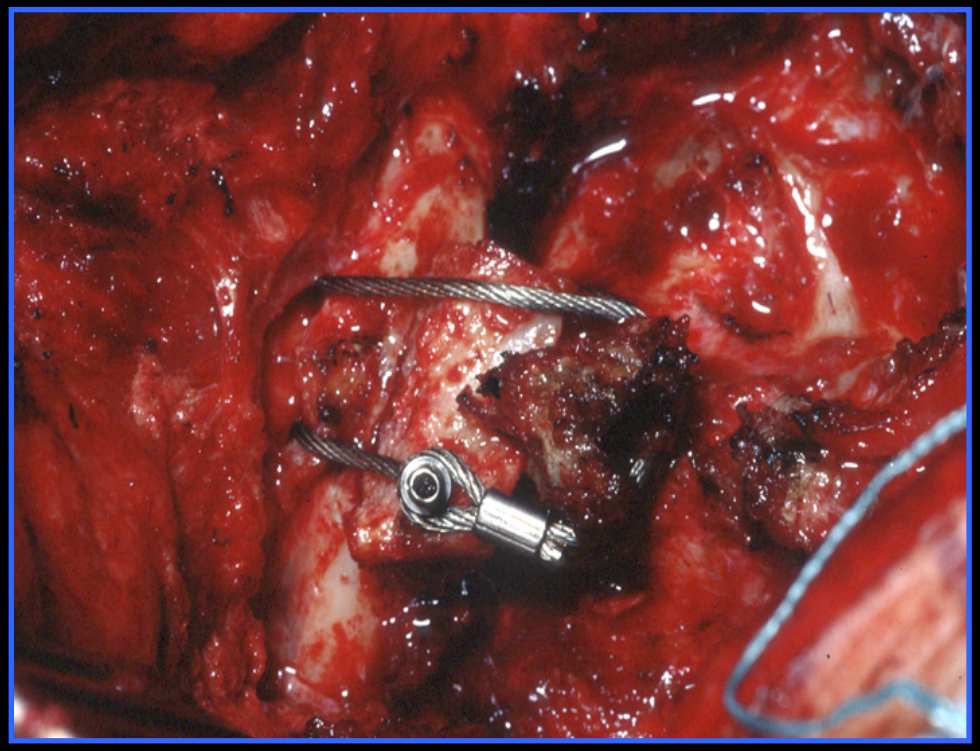
Odontoid peg fracture : Type 2

ODONTOID PED SCREW



57 yr old male : Progressive neck pain and hand weakness. Head injury age 12 diving into swimming pool

C1 / C2 Atlanto - axial fixation

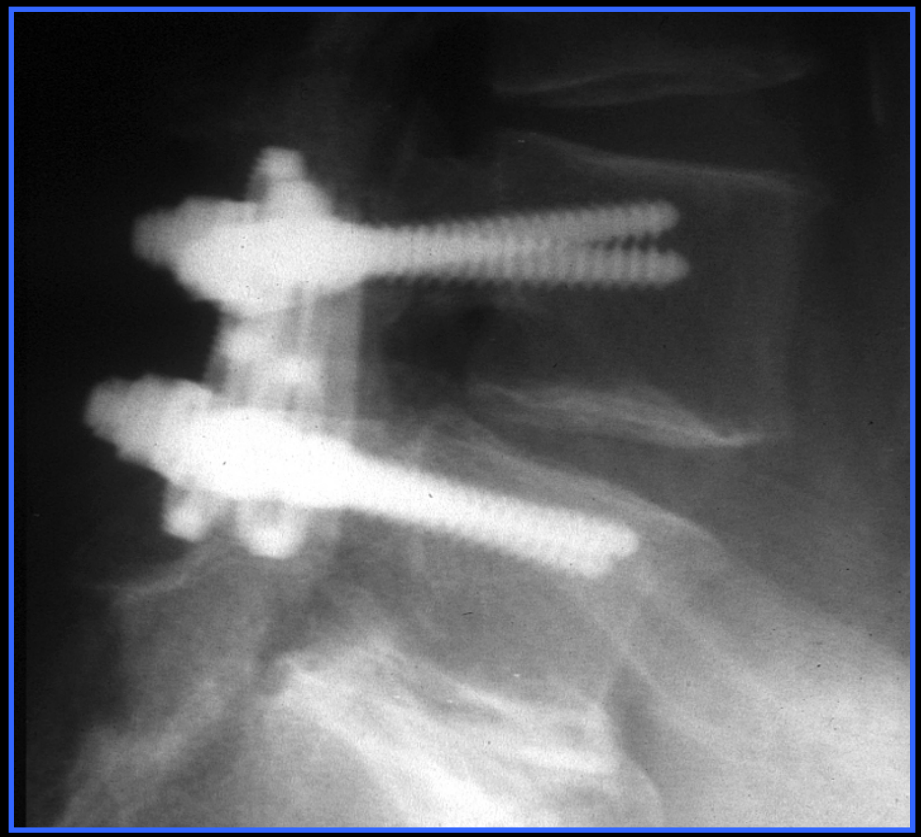


Pseudoarthrosis C2 Fracture

RANSFORD LOOP

Thoraco - Lumbar Fracture

TRANSPEDICULAR
SCREW FIXATION



SPINAL TUMOURS

Spinal tumours

- Extradural : 55 %
  - Metastatic
    - Lung, Breast, Prostate
  - Primary spinal tumours
    - Chordoma, Osteoid osteoma, ABC
- Intradural
  - Extramedullary : 45 %
    - Meningioma, Schwannoma
  - Intramedullary : 5%
    - Ependymoma, Glioma, Dermoid

Presentation

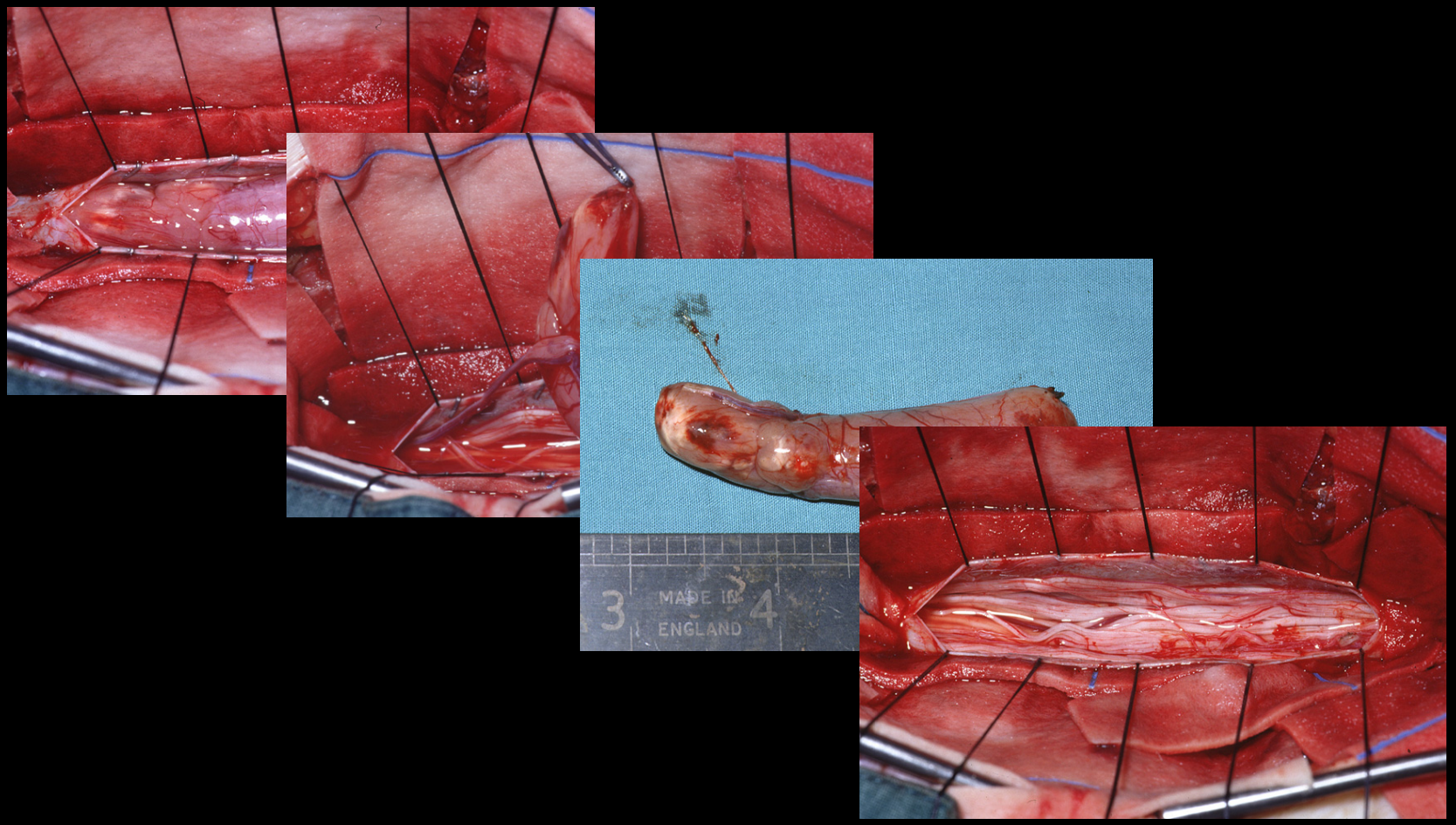
- Pain
  - Radicular, nocturnal, persistant, Valsalva
- Neurological deficit due to :
  - Neuraxial compression
  - Vertebral column instability
    - Motor weakness
    - Sensory loss
    - Gait disturbance
    - Sphincter disturbance

Indications for surgical treatment

- Diagnostic Bx
  - Percutaneous CT guided Bx
  - Open Bx
- Therapeutic Mx
  - Failure of medical therapy : DXT
  - Pathological isolated unstable #
  - Progressive neurological deficit

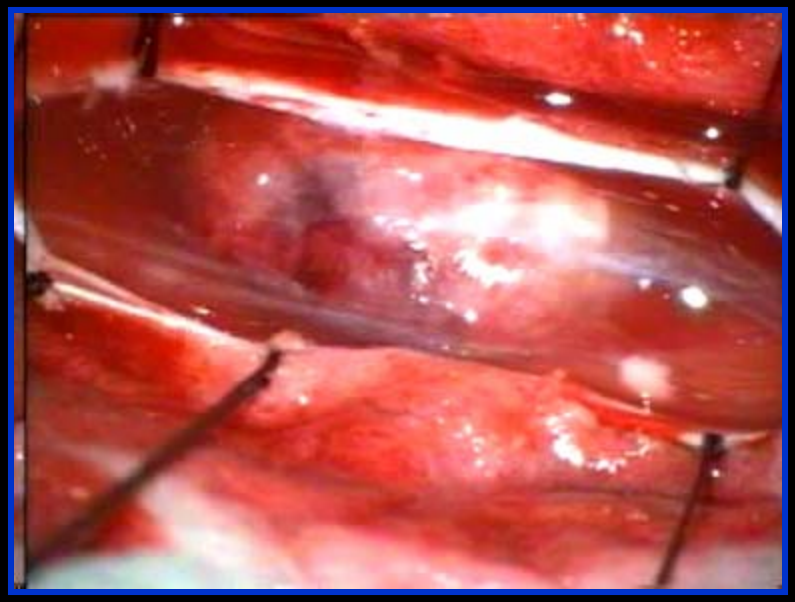
Intradural Extramedullary Tumour

NEUROFIBROMA



Intradural Extramedullary Tumour : Neurofibroma

35 yr male with 18 / 12 persistant back and leg pain

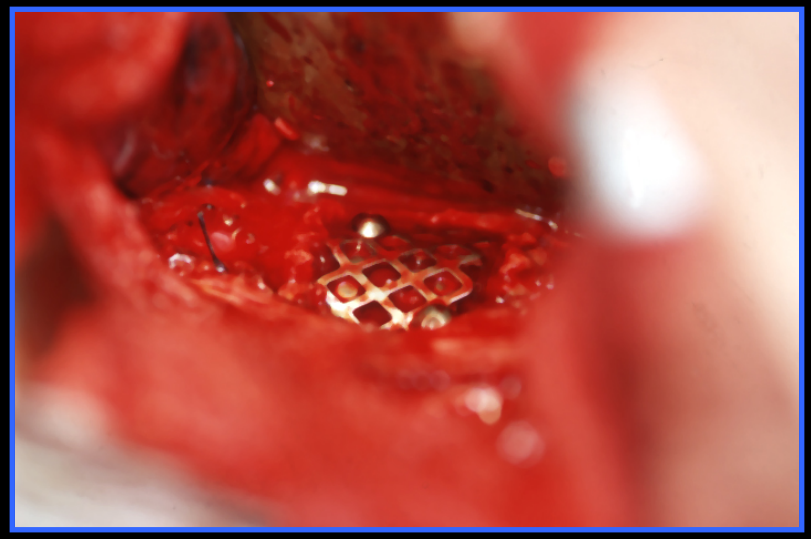


Spinal intramedullary tumour : Astrocytoma

73 female (I A-S) with 3/12 progressive paraparesis

Extradural Tumour

LYMPHOMA

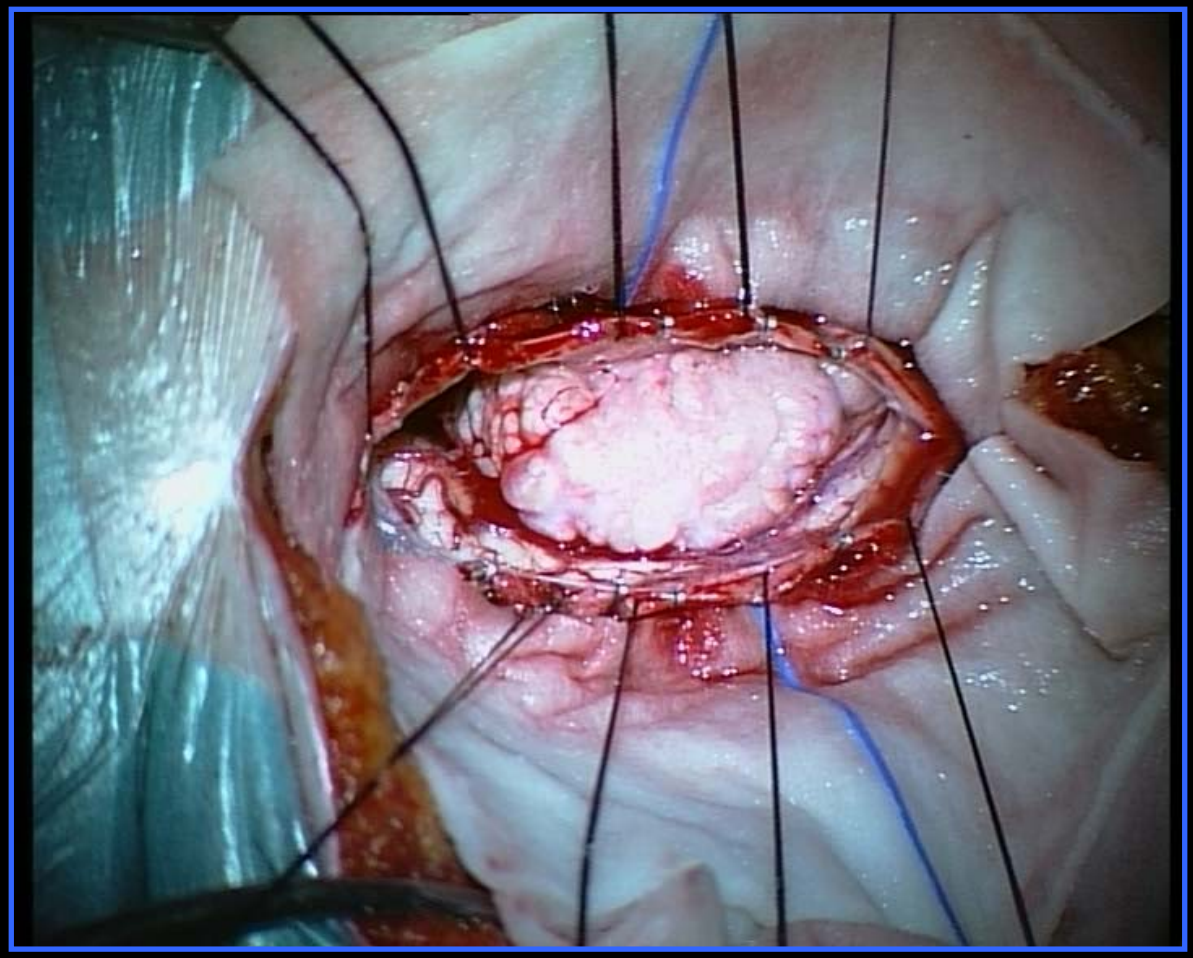


Intradural Extramedullary Tumour

MENINGIOMA

Intradural Extramedullary Tumour

NEUROFIBROMA

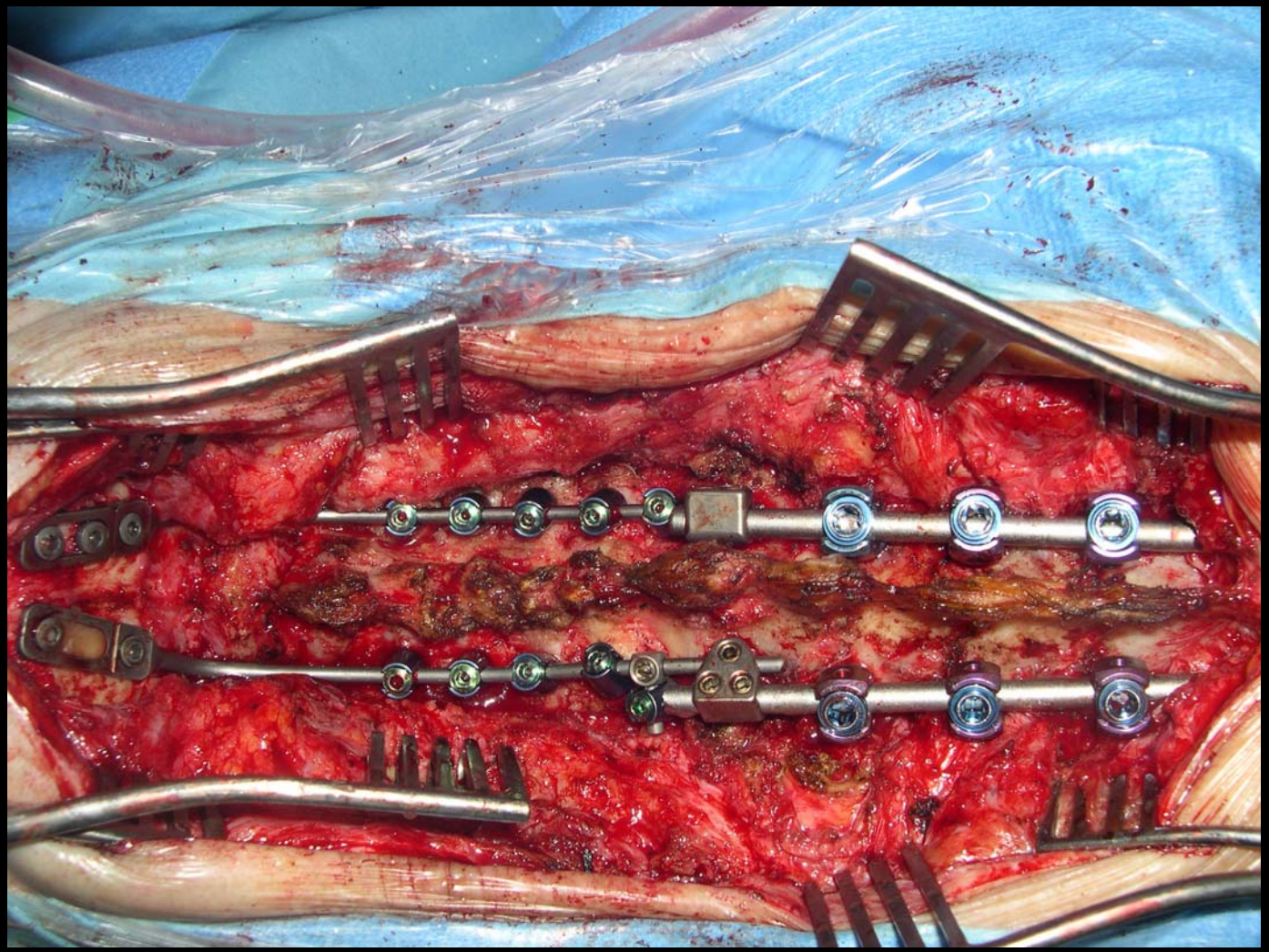


Floppy head syndrome

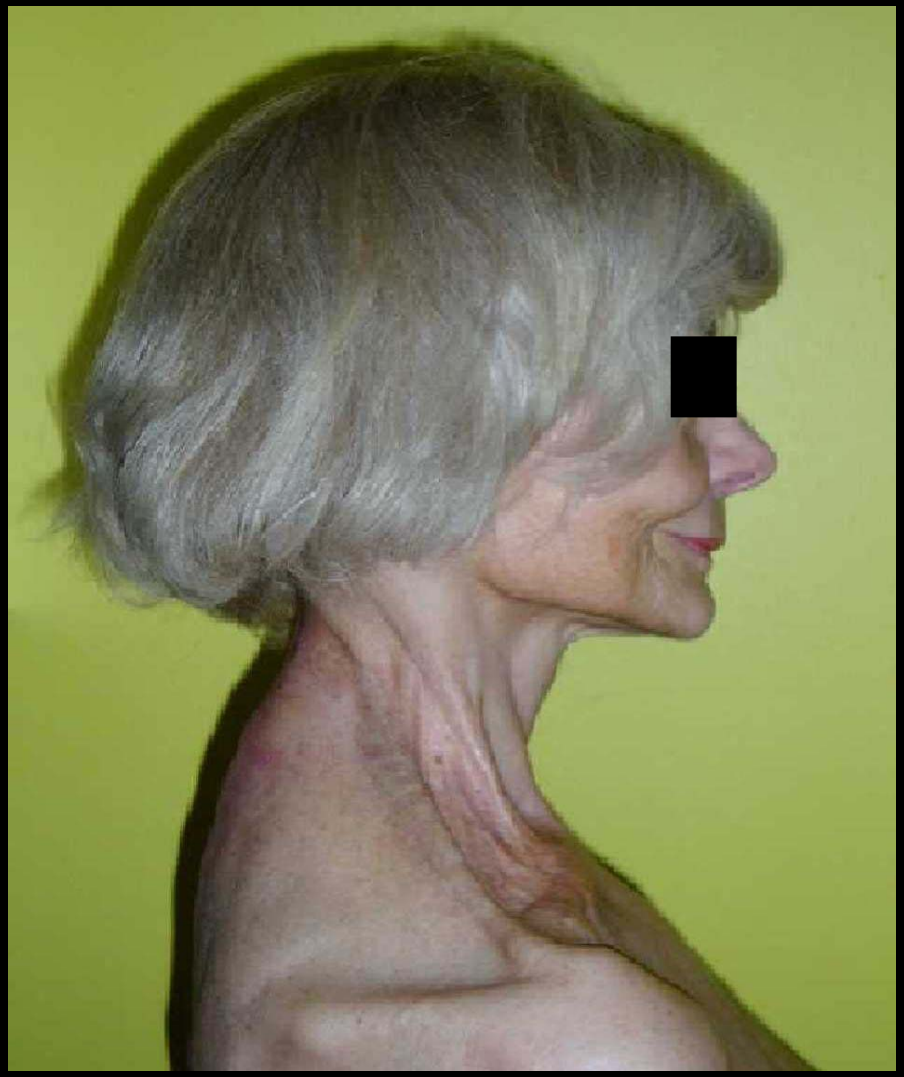

RT
LATERAL


RT NO SUPORT

Occipto – cervicothoracic fixation




RT
Study Time:1
MRN:CC
RIGHT



THANK YOU