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How Aggressive Should Metastatic Tumours Be Treated?

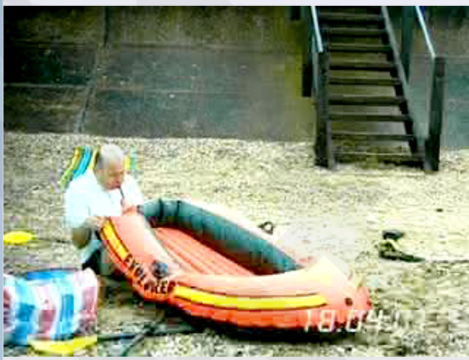
Mr M J H McCarthy

Fusion Portfolio Minimally Invasive Surgery Biomaterials Motion Preservation

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Last Night – This Morning...

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NICE

National Institute for Health and Clinical Excellence

Quick reference guide

Issue date: November 2008

Metastatic spinal cord compression

Diagnosis and management of adults at risk of and with metastatic spinal cord compression

100% clear of guidelines by November 2010

Direct decompressive surgical resection in the treatment of spinal cord compression caused by metastatic cancer: a randomised trial

Roy A Pritchard, Philip A Tabb, William F Regine, Richard Payne, Stephen Saris, Richard J Kryscio, Mohammed Mohiuddin, Byron Young

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Eur Spine J (2013) 22:1383–1388
DOI 10.1007/s00586-012-2635-y

ORIGINAL ARTICLE

Effect of timing of surgery on neurological outcome and survival in metastatic spinal cord compression

N. A. Quraishi · T. S. Rajagopal · S. R. Manoharan · S. Elsayed · K. L. Edwards · B. M. Boszczyk

Conclusions Our results show that surgery should be performed sooner rather than later. Furthermore, earlier surgical treatment within 48 h in patients with MSCC resulted in significantly better neurological outcome. However, the timing of surgery did not influence length of hospital stay, complication rate or patient survival.

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Neuro-Oncology 15(10):1413–1419, 2013.
doi:10.1093/neuonc/not101

Surgical resection of epidural disease improves local control following postoperative spine stereotactic body radiotherapy

Ameen Al-Omar, Laura Masucci, Laurence Masson-Cote, Mikki Campbell, Eshetu G. Atenafu, Amy Parent, Daniel Letourneau, Eugene Yu, Raja Rampersaud, Eric Massicotte, Stephen Lewis, Albert Yee, Isabelle Thibault, Michael G. Fehlings, and Arjun Sahgal

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- Radiotherapy then surgery
 - 50% ambulation post op
- Surgery then radiotherapy
 - 75-90% ambulation post op

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Clinical Study

Trends in the surgical treatment for spinal metastasis and the in-hospital patient outcomes in the United States from 2000 to 2009

Hiroyuki Yoshihara, MD, PhD^{a,b,*}, Daisuke Yoneoka, MS^c

- Surgery for spinal mets ↑
- In hospital complications and costs ↑
- In hospital mortality and LOS ↔

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Prognosis in Patients With Symptomatic Metastatic Spinal Cord Compression

Survival in Different Cancer Diagnosis in a Cohort of 2321 Patients

Soren Schmidt Morgen, MD,* Casper Lund-Andersen, MD,* Claus Falck Larsen, MD, DMSci, MPA,† Svend Aage Engelholm, MD, DMSci,† and Benny Dahl, MD, PhD, DMSci*

- 1/5 received surgery
- 1 year survival = 1/3
- Over 6 years survival lung and renal improved

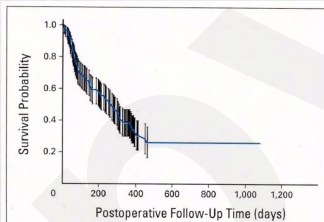
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Survival and Clinical Outcomes in Surgically Treated Patients With Metastatic Epidural Spinal Cord Compression: Results of the Prospective Multicenter AOSpine Study

Michael G. Fehlings, Arick Nater, Lindsay Tetreault, Branko Kopjar, Paul Arnold, Mark Dekutoski, Joel Finkelstein, Charles Fisher, John France, Ziya Gokaslan, Eric Massicotte, Laurence Rhimes, Peter Rose, Arjun Sahgal, James Schuster, and Alexander Vaccaro

- Solitary epidural met
- 1yr survival 38%
- Lung n34 - 135days
- Breast n21 - 368 days
- Renal n22 - 271 days
- Prostate n19 - 200 days



Indications for Surgery

- **What are you trying to achieve?**
 - Improve quality of life

Improve neurology
Prevent neurological ↓
Pain relief
Stabilisation
Local control tumour
Cure?
Diagnosis
Prevent / correct deformity

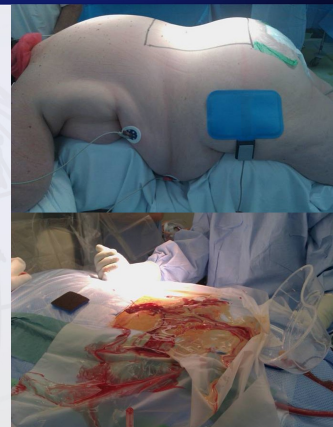
- **Non-maleficence - "first, do no harm"**
- **DO THE APPROPRIATE OPERATION FOR THE PATIENT AND THEIR PATHOLOGY AND YOUR SKILL / ABILITY**

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- Proper
- Planning and
- Preparation
- Prevents
- Piss
- Poor
- Performance



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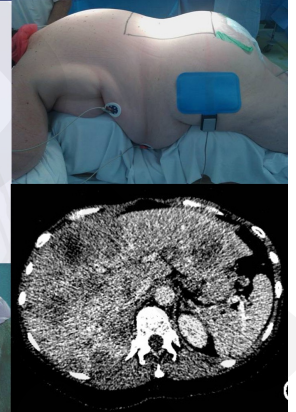
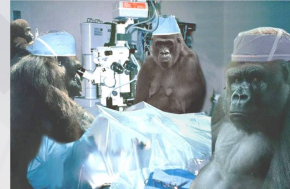
Prevent the



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The other 3 Ps

- Personality - Patient
- Personality - Pathology
- Personality - Practitioner



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The Pathology



- Prostate / Breast / Myeloma / Lymphoma
- Thyroid / Renal may be solitary - ?Mx aggressively
- Bladder / Rectum / Colon / Uterus / Liver / Gallbladder
- Lung / Melanoma / Oesophagus / Stomach / Pancreas / Sarcoma

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How Can We Plan?

Karnofsky Performance Status (KPS)

100%	Normal, no complaints, no disease
90%	Capable normal activity, few symptoms or signs of disease
80%	Normal activity some difficulty, some symptoms or signs
70%	Caring for self, not capable normal activity or work
60%	Requiring some help, able most personal tasks
50%	Requires help often, requires frequent medical care
40%	Disabled, requires special care and help
30%	Severely disabled, requires hospital admission, no risk death
20%	Very ill, urgent admission, supportive measures or treatment
10%	Moribund
0%	Death

Revised Tokuhashi Score

General condition:	Points:
Poor (KPS 10-40%)	0
Moderate (50-70%)	1
Good (80-100%)	2
No. extra-spinal bone mets:	
23	0
1-2	1
0	2
No. mets in vertebral body:	
23	0
1-2	1
0	2
Mets to major internal organs:	
Unremovable	0
Removable	1
None	2
Primary site of cancer:	
Lung, osteosarcoma, stomach, bladder, oesophagus, pancreas	0
Liver, gallbladder, unidentified	1
Others	2
Kidney, uterus	3
Rectum	4
Thyroid, breast, prostate, carcinoid	5
Palsy:	
Complete (Frankel A or B)	0
Incomplete (Frankel C or D)	1
Normal (Frankel E)	2
Score:	
0-8	Prognosis < 6 months
9-11	Prognosis 6-12 months
12-15	Prognosis > 1 year

Scoring System			Prognostic Score	Treatment Goal	Surgical Strategy
Point	Primary tumor	Visceral mets.*			
1	slow growth (breast, thyroid, etc.)	solitary or isolated	2	Long-term local control	Wide or Marginal excision
	moderate growth (kidney, uterus, etc.)		3		
2	rapid growth (lung, stomach, etc.)	multiple	4	Middle-term local control	Marginal or Intralesional excision
	moderate growth (kidney, uterus, etc.)		5		
4	rapid growth (lung, stomach, etc.)	un-treatable	6	Short-term palliation	Palliative surgery
	moderate growth (kidney, uterus, etc.)		7		
			8	Terminal care	Supportive care
			9		
			10		

* No visceral mets. = 0 point. ** Bone mets. including spinal mets.

Tomita

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Van der Linden Score

Symptomatic spinal mets, no neurological deficit, no fracture / instability, renal and melanoma excluded, treated with radiotherapy alone – PROGNOSIS:

Karnofsky score:	80-100 (2 points) 50-70 (1 point) 20-40 (0 points)
Primary Tumour:	Breast (3 points) Prostate (2 points) Lung (1 point) Other (0 points)
Visceral Metastases:	No (1 point) Yes (0 points)
Score:	
0-3	Mean survival 4.8 months (3.8-5.7) median 3
4-5	Mean survival 13.1 months (11.3-14.8) median 9
6	Mean survival 18.3 (15.2-21.4) median 18.7

Modified Bauer Score

Spinal mets, no fracture

Score 1 for each of following:

No visceral metastases
No lung cancer
Primary tumour: breast, kidney (lymphoma, myeloma)
Solitary skeletal metastasis

Score:	
0-1	Supportive care, no surgery median survival 4.8 months
2	Short term palliation, dorsal surgery median survival 18.2 months
3-4	Middle term local control, ventral-dorsal surgery median survival 28.4 months

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Prognostic Factor	Category	Score
Type of tumour	Myeloma/lymphoma	9
	Breast cancer	8
	Prostate cancer	7
	Other tumours	4
Other Bone Metastases*	No	8
	Yes	2
Visceral Metastases*	No	8
	Yes	2
Tumour diagnosis to MESCC	>15 months	7
	≤15 months	4
Ambulatory status pre-treatment	Ambulatory	7
	Non-ambulatory	3
Time to develop motor deficits before treatment	>14 days	8
	8-14 days	6
	1-7 days	3

* At time of radiotherapy

Rades

Score	6 month OS	1 year OS	Median OS (months)*
21-25	4%	0%	2
26-30	11%	6%	5
31-35	48%	23%	7
36-40	87%	70%	25
41-45	99%	89%	62

* Estimated OS: overall survival

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Spinal Instability Neoplastic Score (SINS)

Location:	Points:
Junctional (Occiput-C2, C7-T2, T11-L1, L5-S1)	3
Mobile spine (C3-6, L2-4)	2
Semi-rigid (T3-10)	1
Rigid (S2-5)	0
Pain relief with recumbency and /or pain with movement / loading spine:	
Yes	3
No (occasional pain, not mechanical)	1
Pain free lesion	0
Bone lesion:	
Lytic	2
Mixed (lytic / blastic)	1
Blastic	0
Radiographic spinal alignment:	
Subluxation / translation	4
De novo deformity (kyphosis / scoliosis)	2
Normal alignment	0
Vertebral body collapse:	
> 50%	3
<50%	2
No collapse > 50% body involved	1
None of above	0
Posterolateral spine involvement: (facet, pedicle or costovertebral joint fracture or Replacement by tumour)	
Bilateral	3
Unilateral	1
None	0

≥7 = op

Spine 2011

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Table IV. Oswestry Spinal Metastasis Risk Index (OSRI)

Characteristic	Description	Score*
Primary tumour		
Slow growth	Breast, thyroid, prostate, myeloma, 1 haemangioma, endothelioma, non-Hodgkins lymphoma	1
Moderate growth	Kidney, uterus, tonsils, epipharynx, 2 synovial cell sarcoma, metastatic thymoma	2
Rapid growth	Stomach, colon, liver, melanoma, 4 teratoma, sigmoid colon, pancreas, rectum, unknown origin	4
Very rapid growth	Lung	5
General condition (KPS†)		
Good	KPS 80% to 100%	0
Moderate	KPS 50% to 70%	1
Poor	KPS 10% to 40%	2

* total score is sum of the two sub-scores. Scoring for general condition has been reversed compared with the revised Tokuhashi scoring system to obtain an index of risk
† KPS, Karnofsky Performance Status

Table V. Median survival time in each risk category. The calculation of the Brookmeyer-Crowley 95% confidence interval (CI) was based on log-transformed interval

Risk index	n	Median survival time (95% CI) (mths)	85 th centile of survival time (mths)
1	47	23 (12 to 36)	69
2 or 3	82	6 (4 to 9)	30
4 or 5	43	4 (3 to 5)	12
6	16	2 (1 to 3)	6
7	11	1 (1 to 2)	2

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I saw this in a journal...

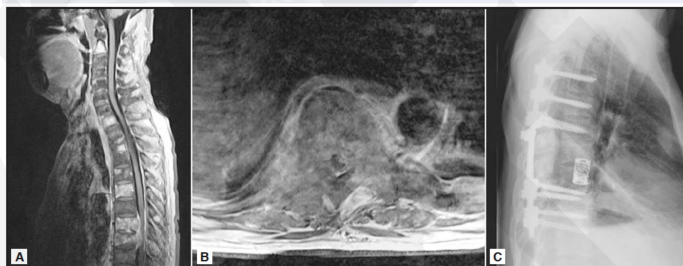
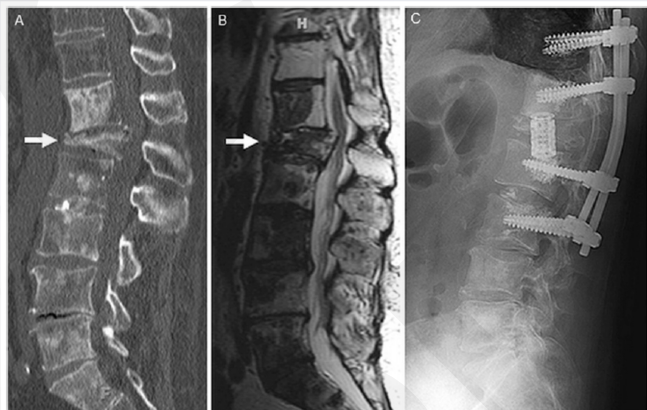


Fig A-C. — (A) Sagittal and (B) axial gadolinium-enhanced T1 MRIs of a 67-year-old man who presented with acute onset of leg weakness secondary to high-grade spinal cord compression and a metastatic prostate tumor. (C) A postoperative radiograph after decompression shows cage and pedicle screw stabilization.

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...and this...



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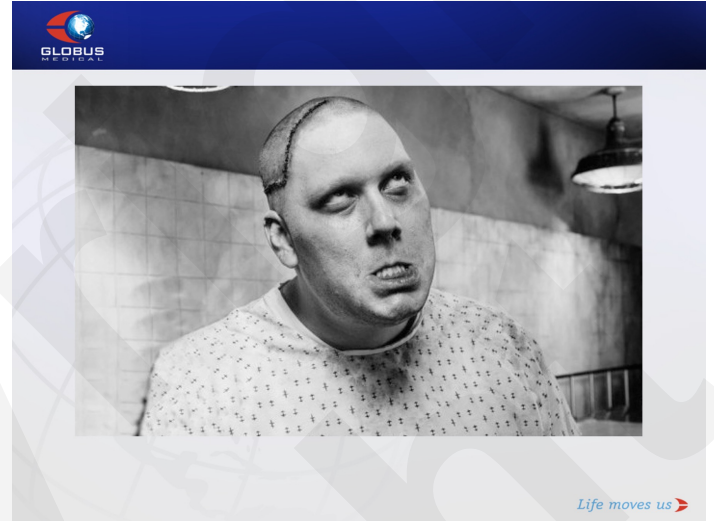
...and I thought this

A man's got to know his limitations



- Are we doing too much?
- Do we know when to quit?
- ...admittedly I've only seen the images...treat the man and not the scan!
- Transfer issues...

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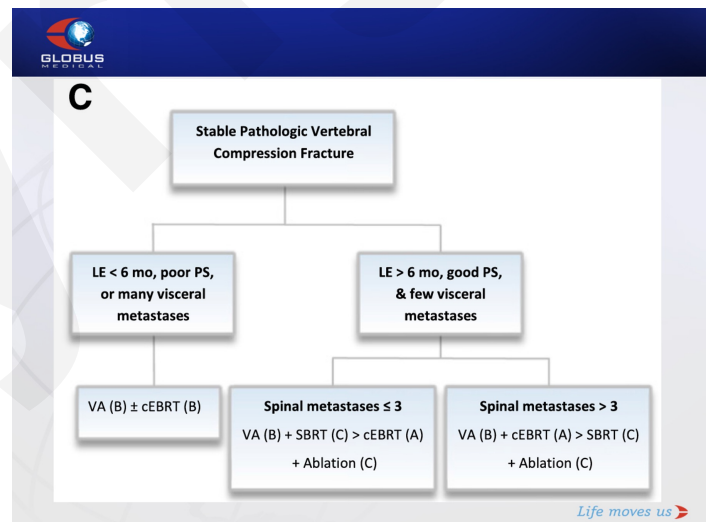
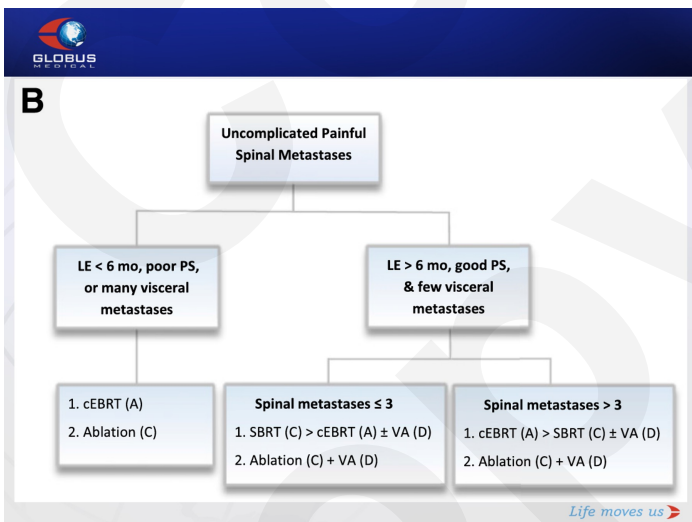
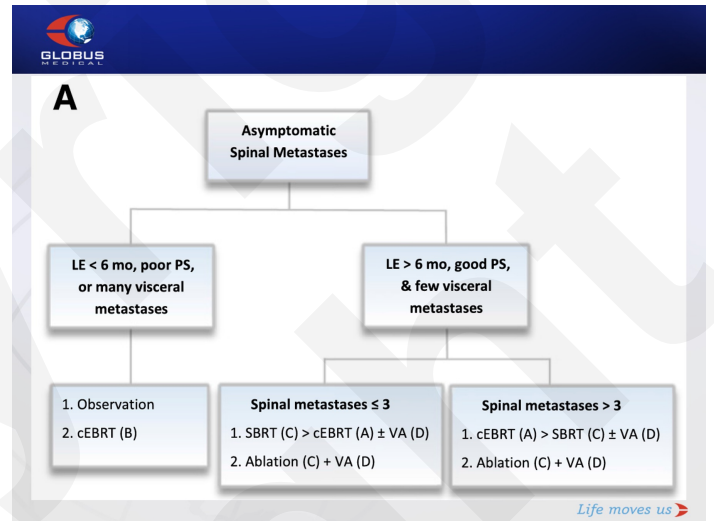
2015

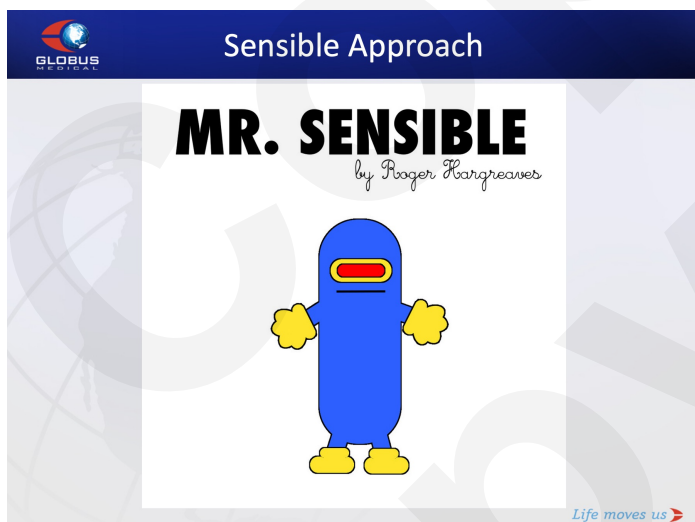
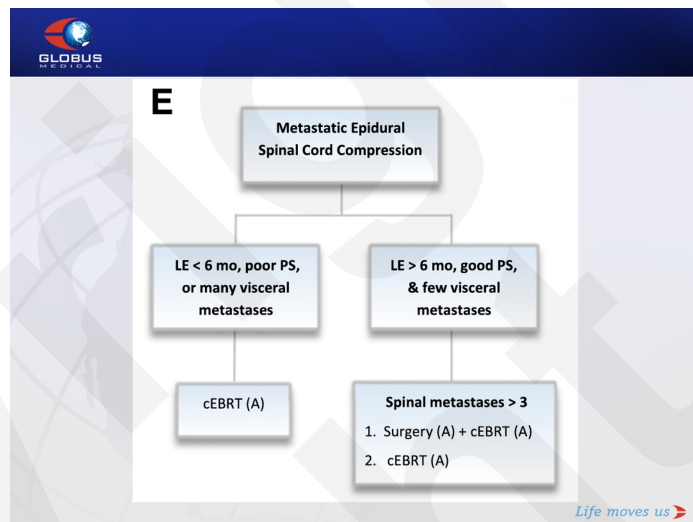
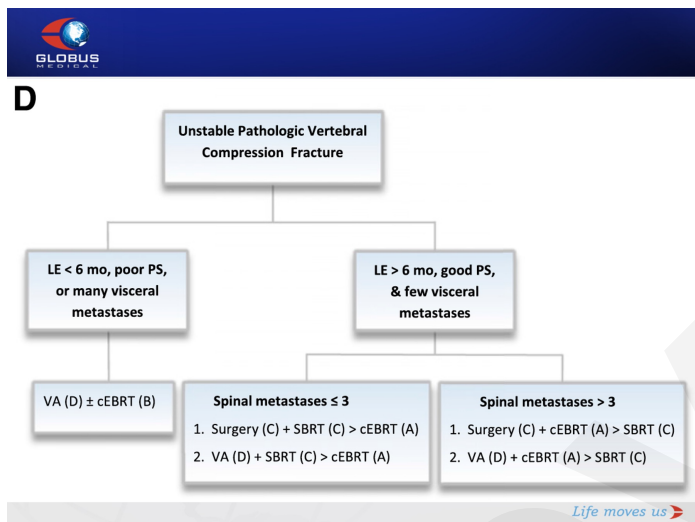
The Oncologist®

Symptom Management and Supportive Care

The Metastatic Spine Disease Multidisciplinary Working Group Algorithms

ADAM N. WALLACE,^a CLIFFORD G. ROBINSON,^b JEFFREY MEYER,^c NAM D. TRAN,^{d,e,h} AFSHIN GANGI,ⁱ MATTHEW R. CALLSTROM,^j SAMUEL T. CHAO,^k BRIAN A. VAN TINE,^l JONATHAN M. MORRIS,^j BRIAN M. BRUEL,^k JEREMIAH LONG,^a ROBERT D. TIMMERMAN,^a JACOB M. BUCHOWSKI,^d JACK W. JENNINGS^a





- Surgical Candidate**
- ANY OF THE FOLLOWING:**
- Progressive / impending neurological deficit
 - Spinal instability / collapse / deformity
 - Paralysed <24hours
 - Intractable pain (including paralysed >24 hours)
 - Need histological confirmation
 - Growing tumour resistant to non-operative measures
 - Relapse after / deterioration during radiotherapy
 - Reached spinal cord radiotherapy tolerance
- Life moves us ➤

- Surgical Candidate**
- AND ALL OF THE FOLLOWING:**
- Prognosis >3-4/12
 - Patient willing to have surgery
 - Surgery is technically possible
- Life moves us ➤

Surgical Candidate

Eur Spine J
DOI 10.1007/s00586-016-4397-4

CrossMark

ORIGINAL ARTICLE

Evaluation of the relevance of surgery in a retrospective case series of patients who underwent the surgical treatment of a symptomatic spine metastasis from lung cancer

Fahed Zairi¹ · Mélodie-Anne Karnoub¹ · Marie-Hélène Vieillard² · Alkis Bouras¹ · Paulo Marinho¹ · Mohamed Allaoui¹ · Patrick Devos¹ · Richard Assaker¹

- **Median survival 2.1 months**

Conclusion A strict patient selection is required to limit the iatrogenic effect of surgery, which may alter the quality of life of these frail patients with limited life expectancy.

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Research Paper

Clinical & Experimental Metastasis

January 2014, Volume 31, Issue 1, pp 47-55

First online: 03 September 2013

Prolonged survival following aggressive treatment for metastatic breast cancer in the spine

Patricia L. Zadnik, Lee Hwang, Derek G. Ju, Mari L. Groves, Jackson Sui, Alp Yurter, Timothy F. Witham, Ali Bydon, Jean-Paul Wolinsky and 2 more

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What goes wrong?

J Neurosurg Spine 21:698-703, 2014
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Adverse events in emergency oncological spine surgery: a prospective analysis

Clinical article

NICOLAS DEA, M.D.,¹ ANNE VERSTEEG, B.Sc.,² CHARLES FISHER, M.D., M.H.Sc.,¹ ADRIENNE KELLY, M.D.,¹ DENNIS HARTIG, M.D.,¹ MICHAEL BOYD, M.D.,¹ SCOTT PAQUETTE, M.D.,¹ BRIAN K. KWON, M.D., Ph.D.,¹ MARCEL DVORAK, M.D.,¹ AND JOHN STREET, M.D., Ph.D.¹

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TABLE 3: Summary of AEs in 101 patients

Variable	% of Patients*
AEs	76.2
any AEs	1.8
mean no. AEs/patient	10.9
in-hospital death	31.7
intraop AEs, overall	16.8
blood loss >2 L	9.9
iatrogenic dural tear	5.9
revision of instrumentation	2.0
nerve root injury	1.0
cardiac event	66.3
postop AEs, overall	20.8
delirium	5.9
transient neurological deterioration	4.0
pressure sores	4.0
deep vein thrombosis	2.0
early construct failure	11.0
electrolyte imbalance	4.0
arrhythmia	5.0
dysphagia	
infection	
urinary tract infection	34.7
pneumonia	11.9
systemic sepsis	3.9
deep wound infection	3.9
superficial wound infection	2.0

* Values are the percentage of 101 patients unless otherwise stated.

- 76%
- 11% RIP in hospital
- 10% dural tear
- 21% delirium
- 35% UTI
- 12% LRTI
- 6% SSI

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The Spine Journal 15 (2015) 375-435

THE
SPINE
JOURNAL

Original Article

Reoperation rates in the surgical treatment of spinal metastases

Nasir A. Quraishi, LL.M., FRCS (Tr&Orth)^{a,*}, Ali Rajabian, MRCSEd^a, Anthony Spencer, MD^a, George Arealis, MD^a, Hossein Mehdian, FRCS(Orth)^a, Bronek M. Boszczyk, PD Dr.med^a, Kimberley L. Edwards, PhD^b

- Reoperation 10.7% over 8 years
- 289 / 384 pts met criteria
- 31 / 289 reops
- 42% SSI (5% total)
- 29% instrumentation failure (3% total)
- 16% Local recurrence (1.5% total)

**Patient Cohort
Often one chance op**

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ORIGINAL ARTICLE - PALLIATIVE CARE

Complications After Percutaneous Pedicle Screw Fixation for the Treatment of Unstable Spinal Metastases

Anne L. Versteeg, MD¹, Jorrit-Jan Verlaan, MD, PhD¹, Paul de Baat, MD², Tim U. Jiya, MD³, Agnita Stadhouders, MD³, Carel H. Diekerhof, MD³, Guido B. van Solinge, MD², and F. Cumhur Oner, MD, PhD¹

TABLE 3 Complications in 101 patients

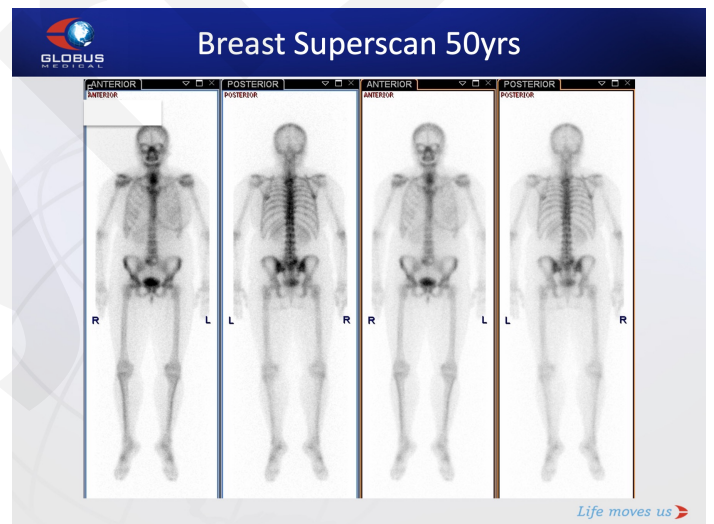
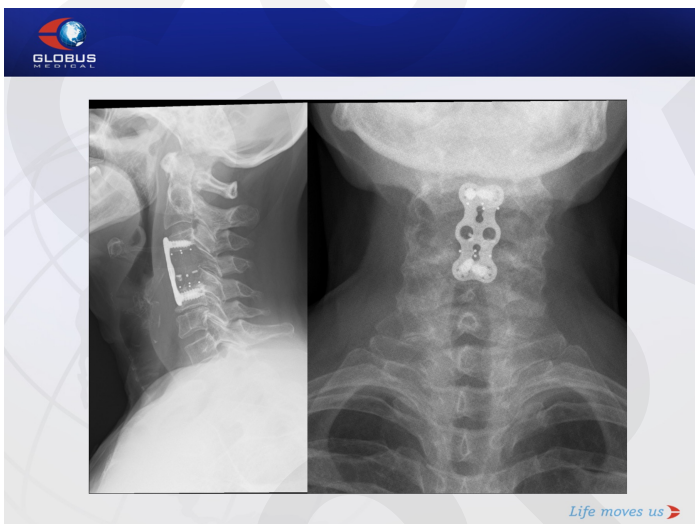
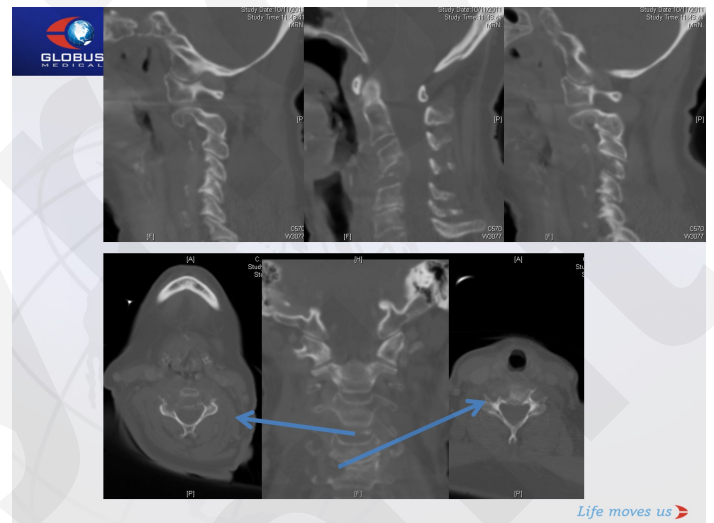
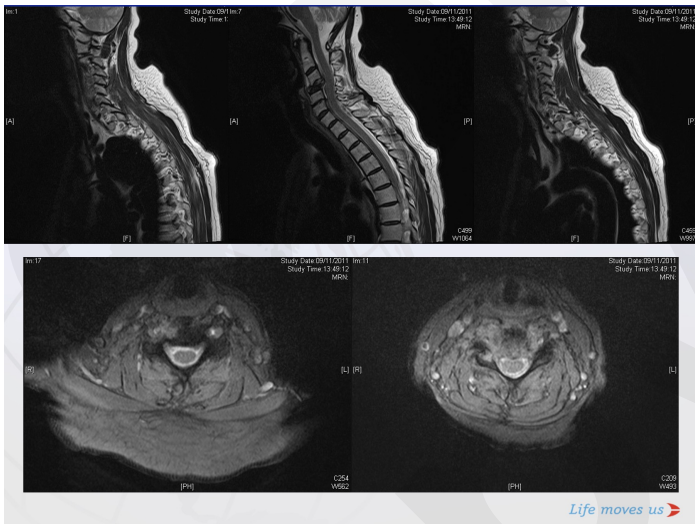
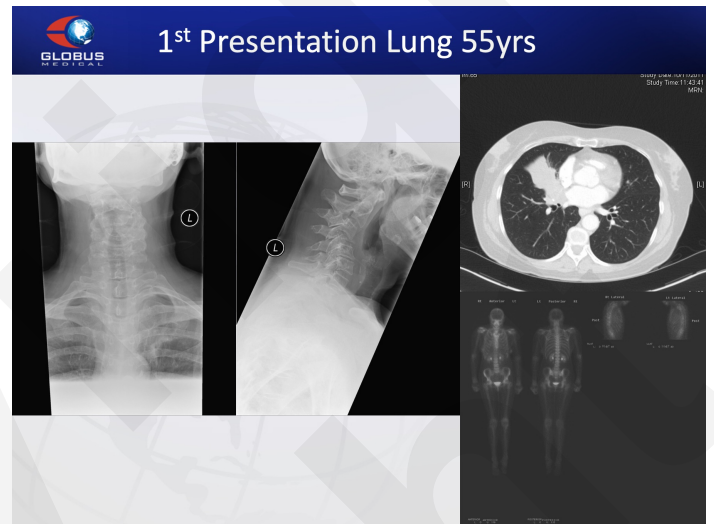
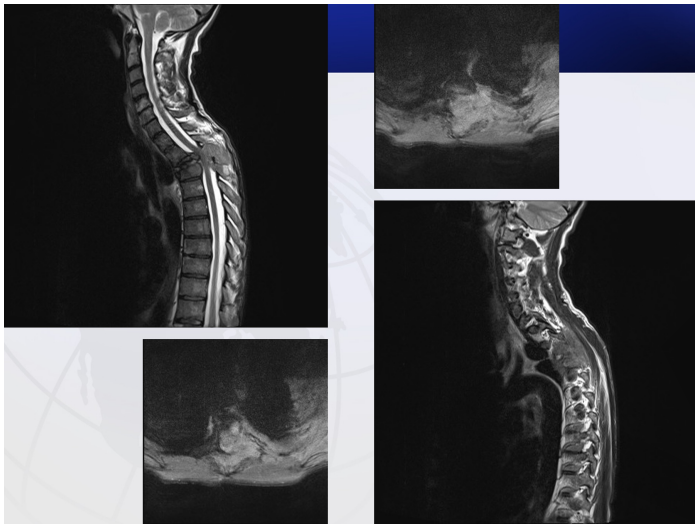
Complication	n (%)
Superficial wound infection	2 (2)
Deep wound infection	2 (2)
Neurologic deterioration	
Transient deterioration	1 (1)
Surgical permanent deterioration	2 (2)
Secondary permanent deterioration	3 (3)
Construct failure	
Within 3 months	1 (1)
After 3 months	3 (3)
Malposition of screw	1 (1)
Reoperation	6 (6)
Other complications	9 (9)

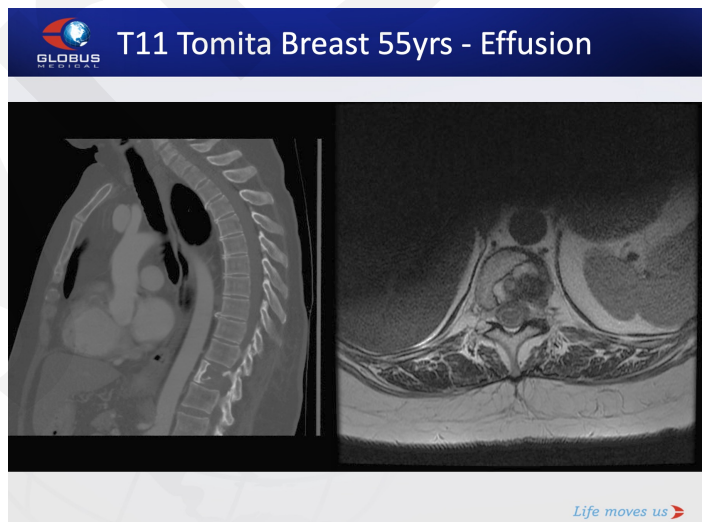
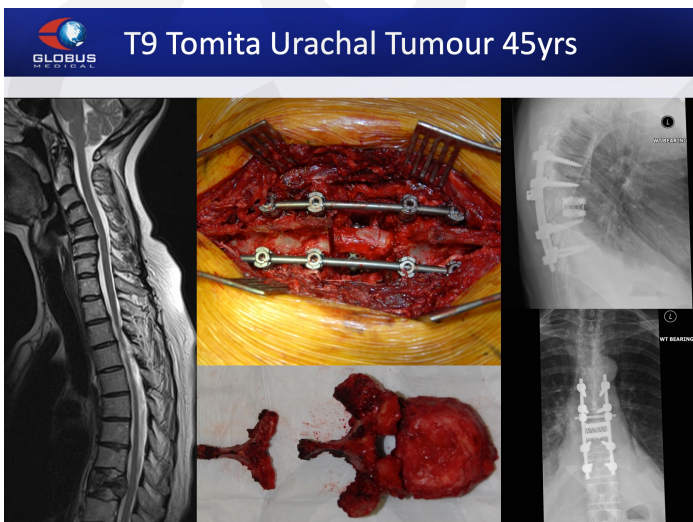
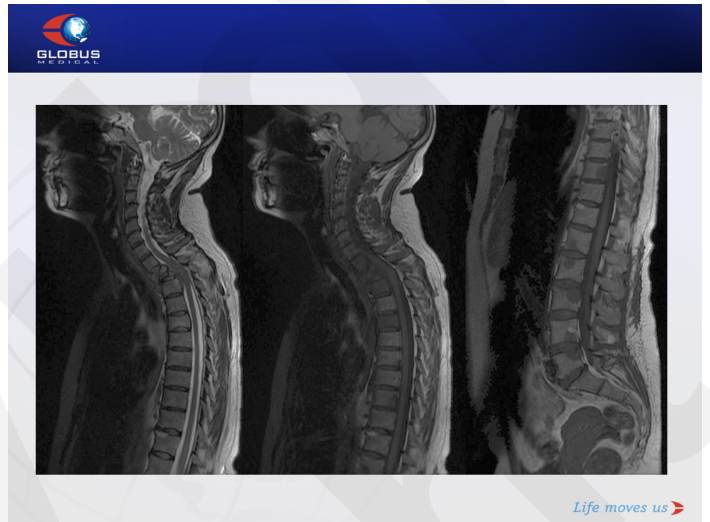
**Overall 18% patients
had one or more
complication**

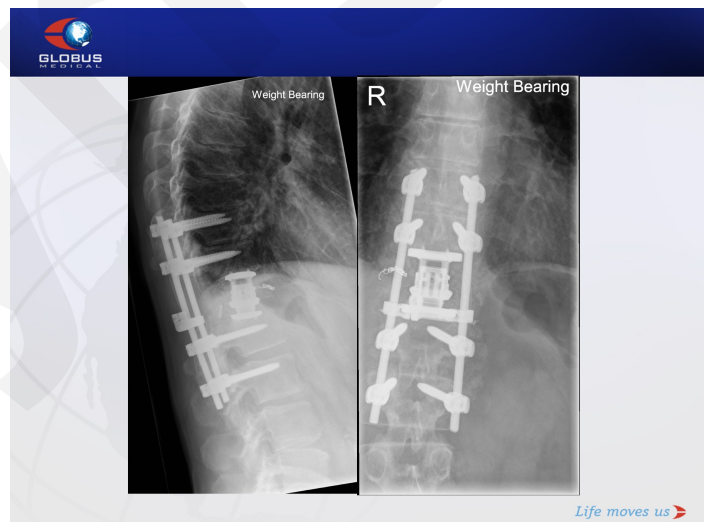
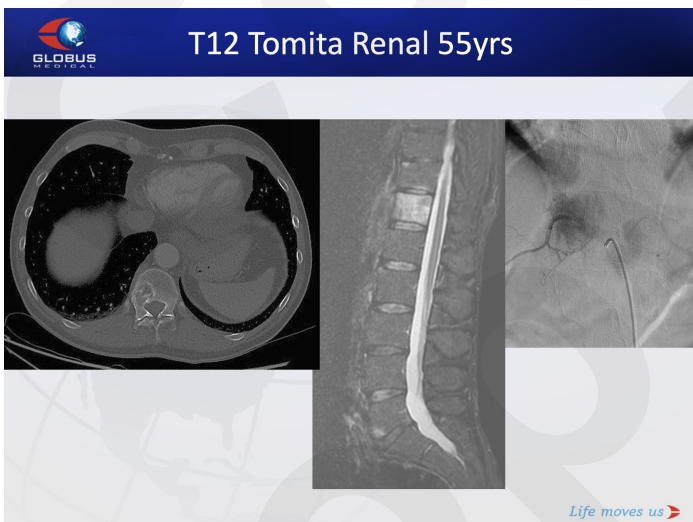
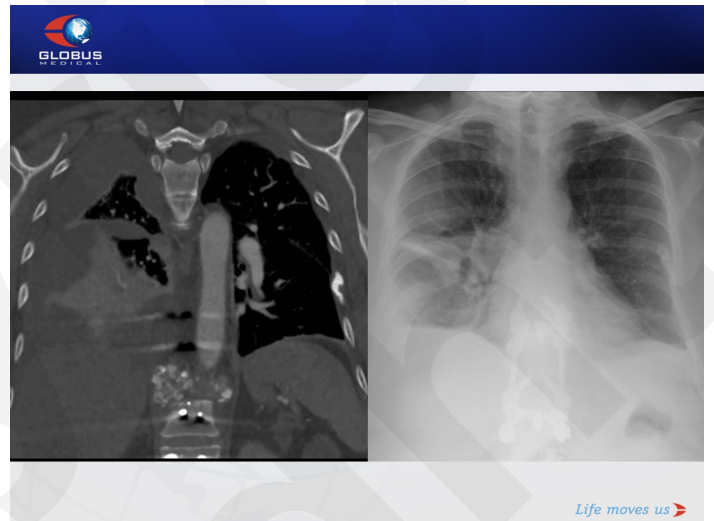
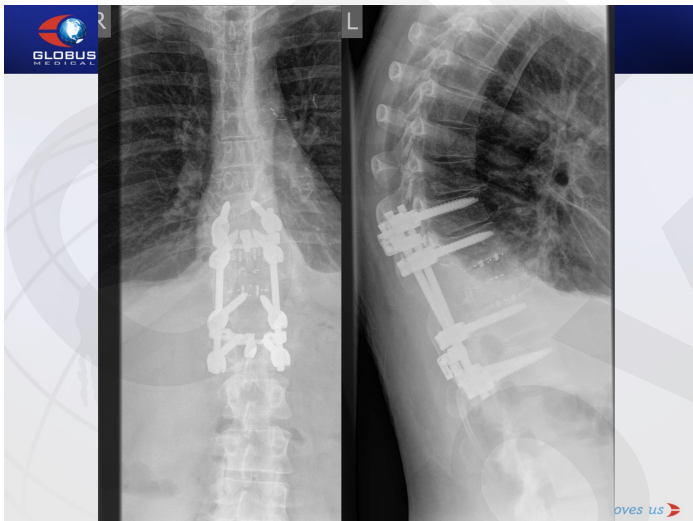
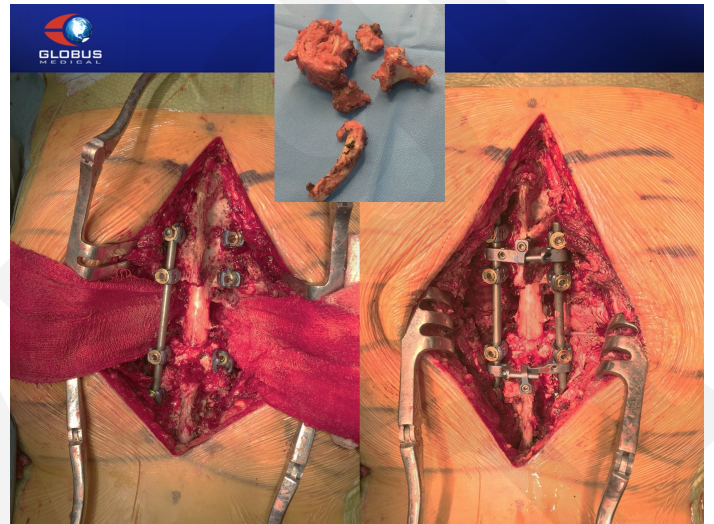
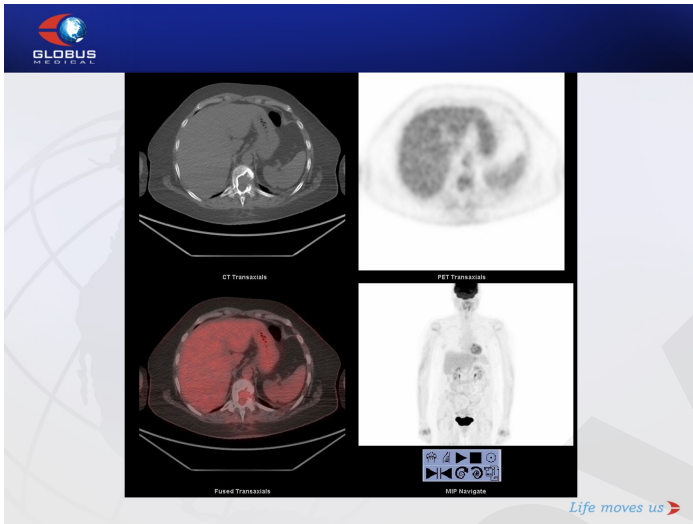
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At last some case examples!

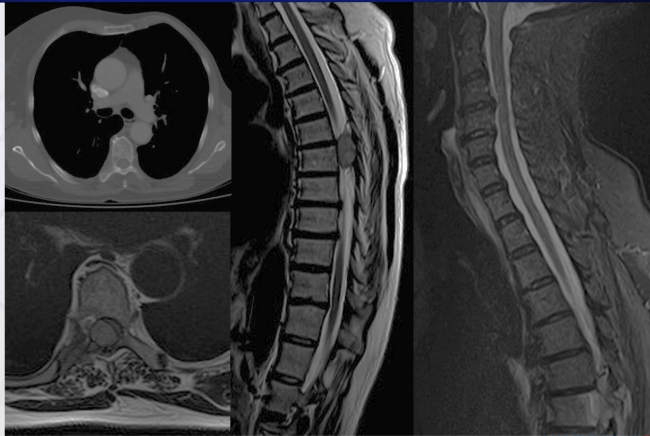
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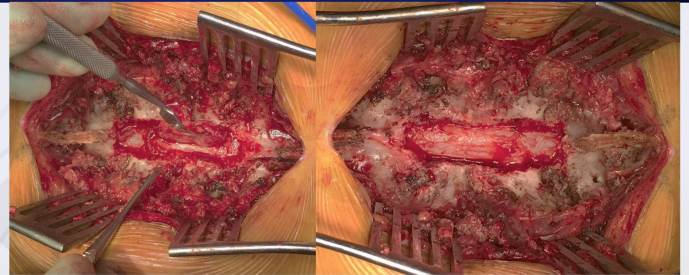




The Breast Arrest 65yrs

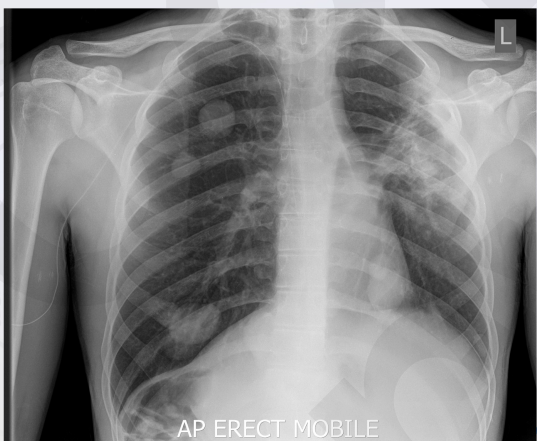


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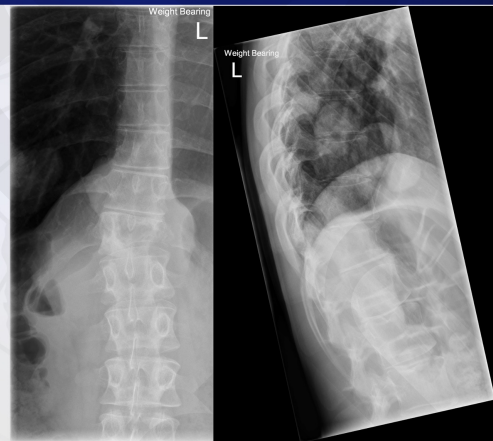


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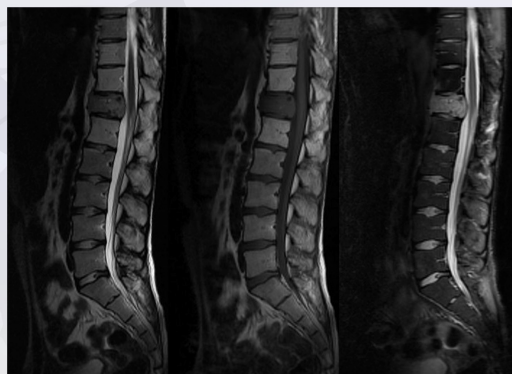
Fibrolamellar Hepatocellular 18yrs



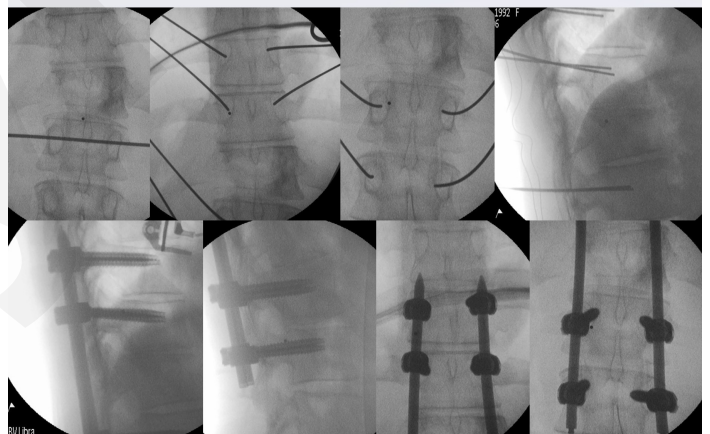
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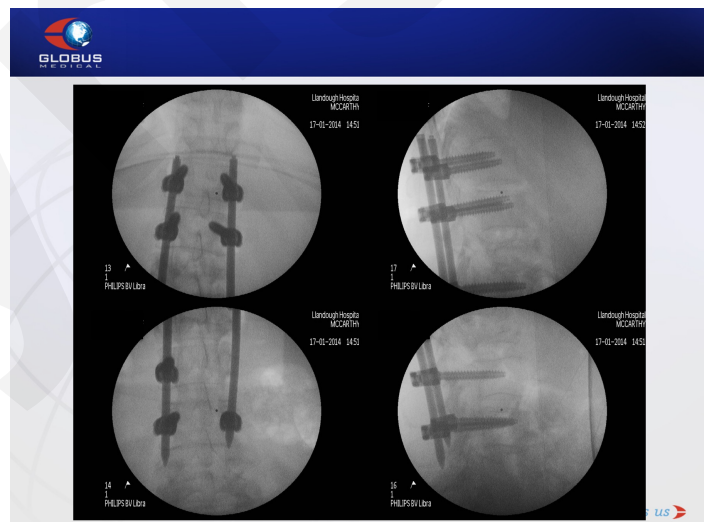
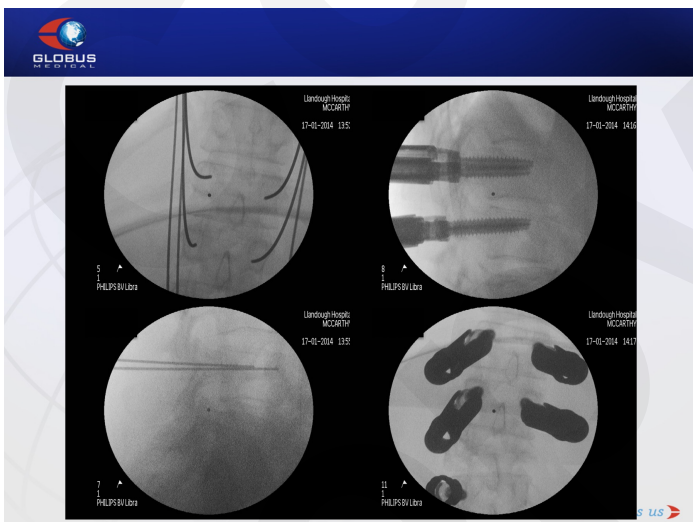
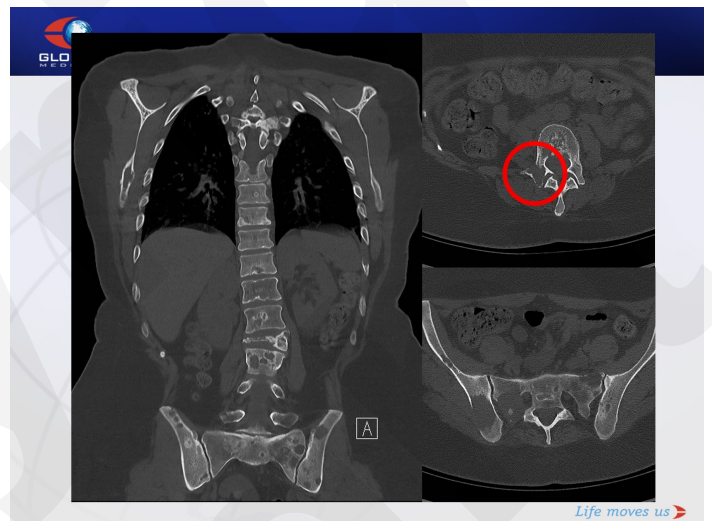
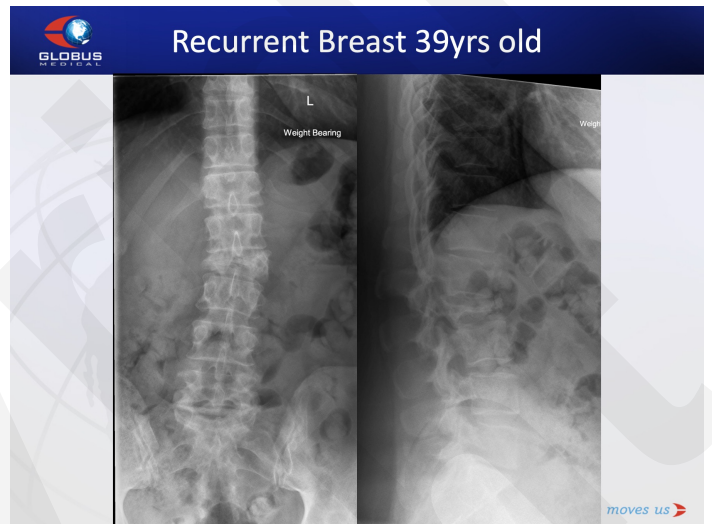


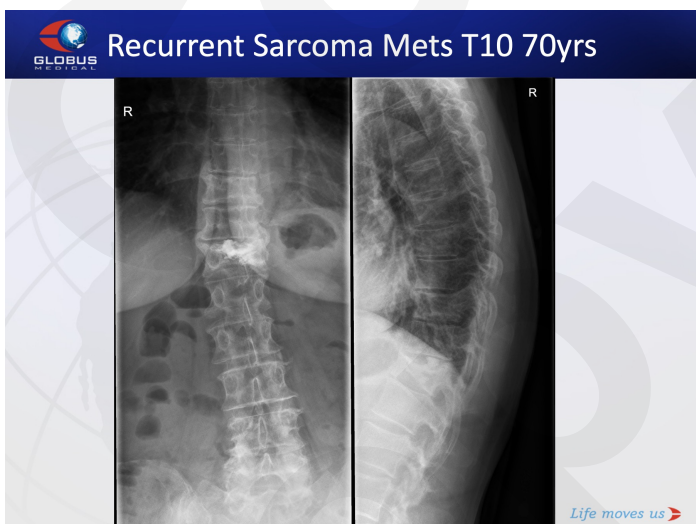
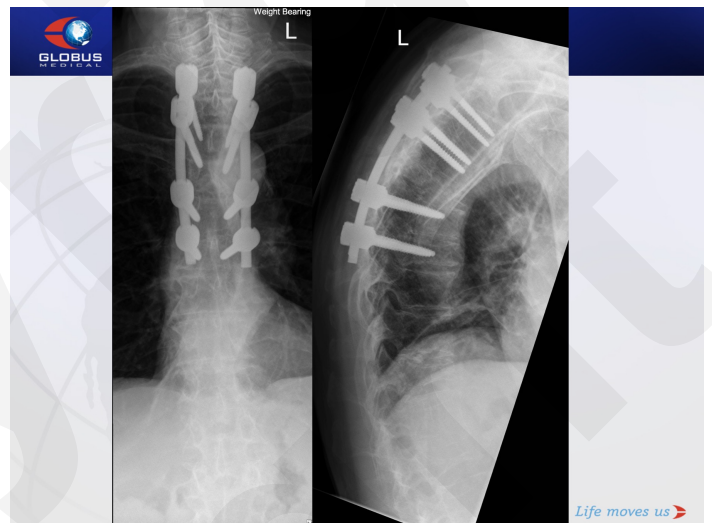
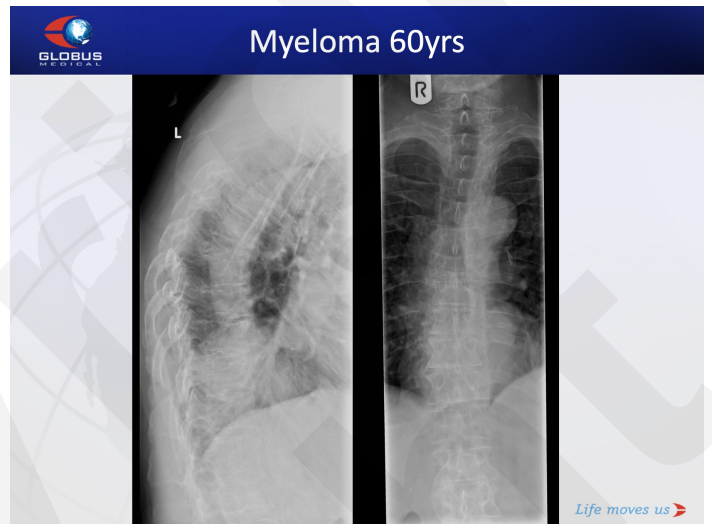
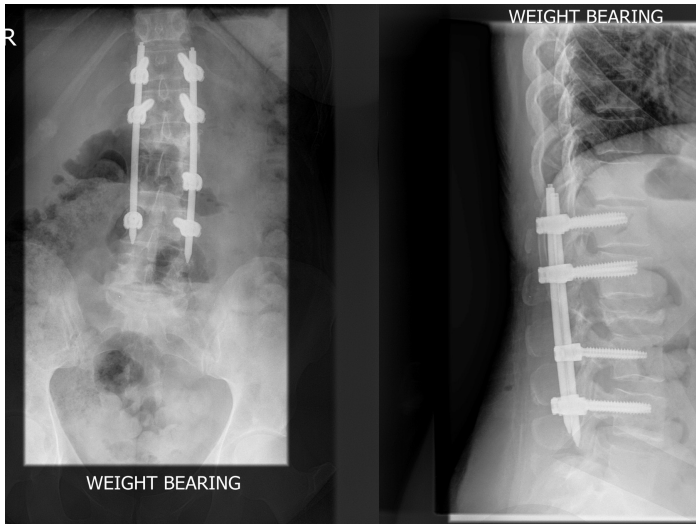
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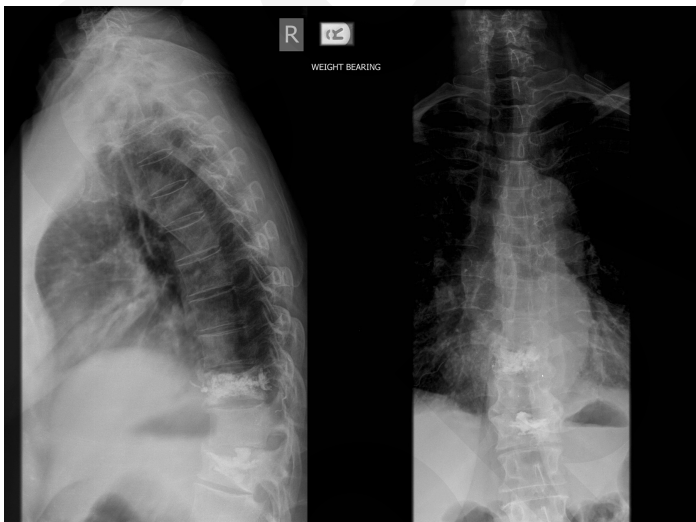
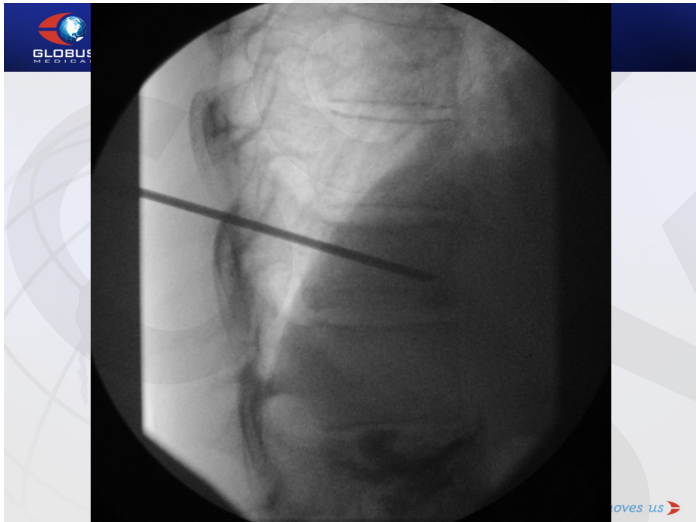


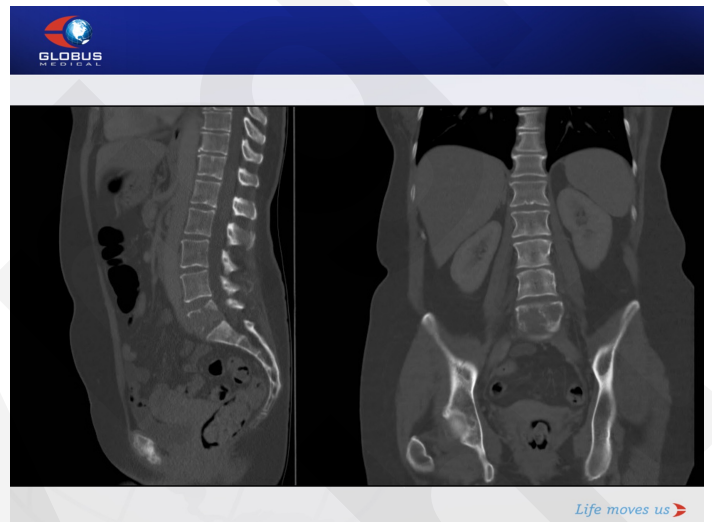
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- Ideas...
- L5 severe pain pathological collapse body only
- Unable sit up let alone stand
- No obvious mets elsewhere
- Tumour with a good prognosis
- How would you do it if she had DXT first...

