
Tumorschmerz

- setzen wir interventionelle Verfahren zu selten ein?
Schmerztherapie
-



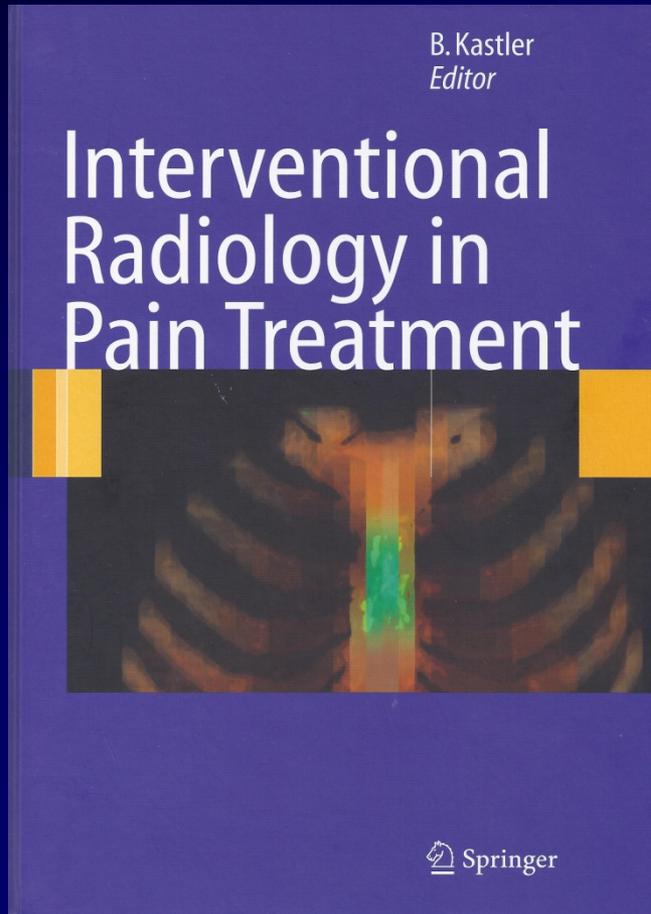
Prof. Dr. K. Wilhelm



Diagnostische und Interventionelle Radiologie
Evangelische Kliniken Bonn gGmbH

Tumorschmerz

setzen wir interventionelle Verfahren zu selten ein?



Schmerztherapie

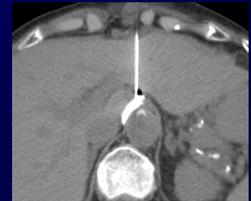
Invasive Verfahren

- Vertebroplastie
- Osteoplastie
- Infiltrationen / Blockaden
- Neurolysen

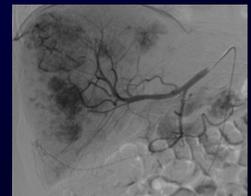
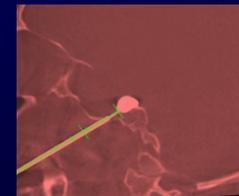


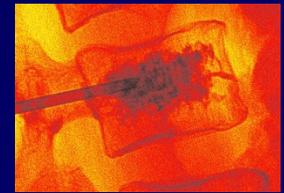
Kombinationseingriffe

- + systemische Therapie
- TACE



Ausblick





Tumorschmerz

setzen wir interventionelle Verfahren zu selten ein?

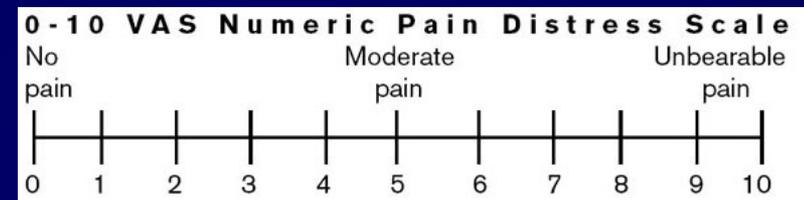
Pain evaluation [VAS]

Numerical Rating Scales (NRS)

11-point scale

that rates the intensity of pain from

0 (no pain) to 10 (the worst possible pain)



Quality of live, mobility - life evaluation questionnaire

EORTC European Organisation for Research and Treatment of Cancer

- 30 questions
- Quality of life
- Mobility
- Gastrointestinal symptoms

- Rating overall quality of life
Intensity 1 (very poor) to 7 (excellent)



EORTC QLQ-C30 (version 3)

We are interested in some things about you and your health. Please answer all of the questions yourself by circling the number that best applies to you. There are no "right" or "wrong" answers. The information that you provide will remain strictly confidential.

Please fill in your initials:

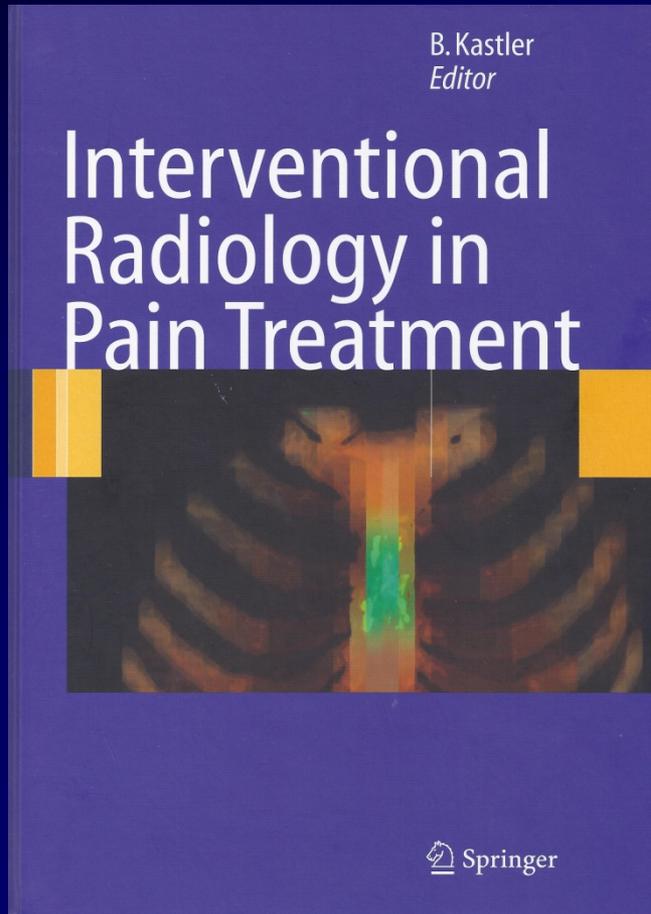
Your birthdate (Day, Month, Year):

During the past week:

	Not at All	A Little	Quite a Bit	Very Much
16. Have you been constipated?	1	2	3	4
17. Have you had diarrhea?	1	2	3	4
18. Were you tired?	1	2	3	4

Tumorschmerz

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Schmerztherapie

Invasive Verfahren

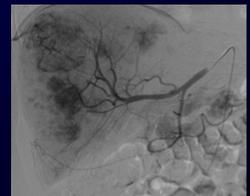
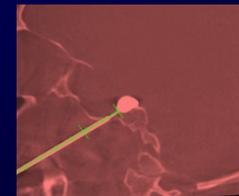
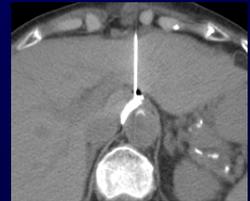
- Vertebroplastie
- Osteoplastie
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Kombinationseingriffe

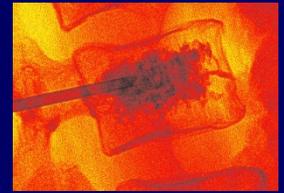
- + systemische Therapie
- TACE



Ausblick



Indikation: Vertebroplastie

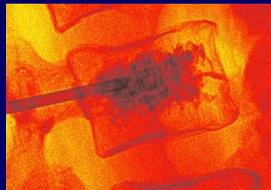


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Leitlinien der Deutschen Röntgengesellschaft zur Vertebroplastie

- **Schmerzhafte nicht-/ osteoporotische Fraktur**
 - konservativer Therapieversuch nicht ausreichend
Leitlinien DVO ≥ 3 Monate (3-6 Wochen)
 - keine Indikation zur OP
- **Schmerzhafte Osteolyse (maligner /benigner Tu)**
 - Metastasen, multiples Myelom, Hämangiome
- **Adjuvante peri-/ intraoperative Stabilisierung**

Abhängig von der klin. Situation kann hiervon abgewichen werden



Tumorschmerz - Vertebroplastie

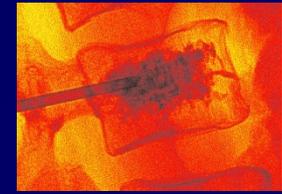
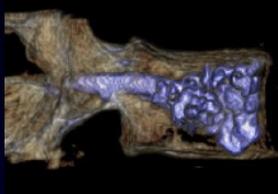
setzen wir interventionelle Verfahren zu selten ein?

Pain Reduction Following Vertebroplasty*

Vertebroplasty Group	# of Pts	Study	Preop VAS	Postop VAS (7 days; 1day - 30 days)	Final Follow-up VAS (2 yrs; 6 months - 5yrs)	Mean Age	Female	Male	Osteoporosis	Tumor/ Metastasis
Appel and Gilula ⁹	23	Retro	7.6 (2.0)	1.7 (1.8)		72	17	6	16	7
Do et al ¹³	167	Pro	8.71 (1.29)	2.77 (2.33)		74.600	127	40	167	0
Evans et al ¹⁴	245	Retro	8.9 (1.7)	3.4 (2.7)		76	184	61	245	0
Heini et al ¹⁵	17	Pro	7.5 (1.86)	3.2 (0.97)	3.4 (0.89)	74	15	2	17	0
Kalmes et al ¹⁶	31	Retro	9.7 (1.0)	1.7(1.9)			0	0	31	0
Kobayashi et al ¹⁷	196	Pro	7.22 (1.89)	2.07 (1.89)		77.900	0	0	196	0
Komemushi et al ¹⁸	49	Pro	7.4 (2.2)	2.5 (2.7)		72.5	36	10	48	1
Liliang et al ²⁰	16	Pro	8.9 (0.6)	4.3 (3.1)	2.8 (2.2)	76.600	12	4	16	0
McGraw et al ²²	99	Pro	8.91 (1.12)	2.02 (1.95)		73.700	79	20	94	5
McKiernan et al ²³	46	Pro	7.7 (1.8)	2.8 (1.8)		74.300	32	14	46	0
Perez-Higueras et al ²⁴	13	Pro	9.07 (0.6)	2.07 (1.14)	2.15 (2.6)	67	10	3	13	0
Prather et al ²⁵	50		7.76 (2.18)	3.10 (2.90)	2.90 (7.00)	68.600	31	19	50	0
Tanigawa et al ²⁶	76	Pro	7.2 (2.0)	2.5 (2.3)	1.0 (0.2)					
Voormolen et al ²⁸	18	Pro	7.1 (1.3)	4.7 (2.1)		72	14	4	18	0
Total	1046								957	13

Vertebroplastie ?

Erfahrungen bei Osteoporose



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 AUGUST 6, 2009 VOL. 361 NO. 6

A Randomized Trial of Vertebroplasty for Painful Osteoporotic Vertebral Fractures

Rachelle Buchbinder, Ph.D., Richard H. Osborne, Ph.D., Peter R. Ebeling, M.D., John D. Wark, Ph.D., Peter Mitchell, M.Med., Chris Wriedt, M.B., B.S., Stephen Graves, D. Phil., Margaret P. Staples, Ph.D., and Bridie Murphy, B.Sc.

ABSTRACT

BACKGROUND Vertebroplasty has become a common treatment for painful osteoporotic vertebral fractures, but there is limited evidence to support its use.

METHODS We performed a multicenter, randomized, double-blind, placebo-controlled trial in which participants with one or two painful osteoporotic vertebral fractures that were of less than 12 months' duration and unhealed, as confirmed by magnetic resonance imaging, were randomly assigned to undergo vertebroplasty or a sham procedure. Participants were stratified according to treatment center, sex, and duration of symptoms (6 weeks or 26 weeks). Outcomes were assessed at 1 week and at 1, 3, and 6 months. The primary outcome was overall pain (on a scale of 0 to 10, with 10 being the maximum imaginable pain) at 3 months.

RESULTS A total of 78 participants were enrolled, and 71 (35 of 38 in the vertebroplasty group and 36 of 40 in the placebo group) completed the 6-month follow-up (97%). Vertebroplasty did not result in a significant advantage in any measured outcome at any time point. There were significant reductions in overall pain in both study groups at each follow-up assessment. At 3 months, the mean (±SD) reductions in the score for pain in the vertebroplasty and control groups were 2.6±2.9 and 1.9±3.3, respectively (adjusted between-group difference, 0.6; 95% confidence interval, -0.7 to 1.8). Similar improvements were seen in both groups with respect to pain at night and at rest, physical functioning, quality of life, and perceived improvement. Seven incident vertebral fractures (three in the vertebroplasty group and four in the placebo group) occurred during the 6-month follow-up period.

CONCLUSIONS We found no beneficial effect of vertebroplasty as compared with a sham procedure in patients with painful osteoporotic vertebral fractures, at 1 week or at 1, 3, or 6 months after treatment. (Australian New Zealand Clinical Trials Registry number, ACTRN012605000079640.)

From the Monash Department of Clinical Epidemiology, Cabrini Hospital, and the Department of Epidemiology and Preventive Medicine, Monash University, Malvern, VIC (R.B., M.P.S., B.M.); Public Health Innovation, Deakin University, Melbourne, VIC (R.H.O.); the Department of Medicine (Royal Melbourne Hospital/Western Hospital), University of Melbourne/Western Hospital, Footscray, VIC (P.R.E.); the Department of Medicine (Royal Melbourne Hospital/Western Hospital) and the Department of Radiology, University of Melbourne, Royal Melbourne Hospital, Parkville, VIC (J.D.W., P.M.); Cabrini Medical Imaging, Cabrini Health, Malvern, VIC (C.W.); and the Australian Orthopaedic Association, National Joint Replacement Register, Data Management & Analysis Centre, University of Adelaide, Adelaide, SA (S.G.) — all in Australia. Address reprint requests to Dr. Buchbinder at the Department of Clinical Epidemiology, Suite 41, Cabrini Medical Centre, 183 Watlington Rd., Malvern, VIC 3144, Australia, or at rachelle.buchbinder@med.monash.edu.au.

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THE NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

A Randomized Trial of Vertebroplasty for Osteoporotic Spinal Fractures

David F. Kallmes, M.D., Bryan A. Comstock, M.S., Patrick J. Heagerty, Ph.D., Judith A. Turner, Ph.D., David J. Wilson, F.R.C.R., Terry H. Diamond, F.R.A.C.P., Richard Edwards, F.R.C.R., Leigh A. Gray, M.S., Lydia Stout, B.S., Sara Owen, M.Sc., William Hollingworth, Ph.D., Basavaraj Ghodke, M.D., Deborah J. Annesley-Williams, F.R.C.R., Stuart H.Ralston, F.R.C.P., and Jeffrey G. Jarvik, M.D., M.P.H.

ABSTRACT

BACKGROUND Vertebroplasty is commonly used to treat painful, osteoporotic vertebral compression fractures.

METHODS In this multicenter trial, we randomly assigned 131 patients who had one to three painful osteoporotic vertebral compression fractures to undergo either vertebroplasty or a simulated procedure without cement (control group). The primary outcomes were scores on the modified Roland-Morris Disability Questionnaire (RM-Q) (on a scale of 0 to 23, with higher scores indicating greater disability) and patients' ratings of average pain intensity during the preceding 24 hours at 1 month (on a scale of 0 to 10, with higher scores indicating more severe pain). Patients were allowed to cross over to the other study group after 1 month.

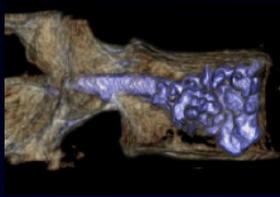
RESULTS All patients underwent the assigned intervention (68 vertebroplasties and 63 simulated procedures). The baseline characteristics were similar in the two groups. At 1 month, there was no significant difference between the vertebroplasty group and the control group in either the RM-Q score (difference, 0.7; 95% confidence interval, [CI], -1.3 to 2.8; P=0.49) or the pain rating (difference, 0.7; 95% CI, -0.3 to 1.7; P=0.19). Both groups had immediate improvement in disability and pain scores after the intervention. Although the two groups did not differ significantly on any secondary outcome measure at 1 month, there was a trend toward a higher rate of clinically meaningful improvement in pain (a 30% decrease from baseline) in the vertebroplasty group (64% vs. 48%, P=0.06). At 3 months, there was a higher crossover rate in the control group than in the vertebroplasty group (43% vs. 12%, P<0.001). There was one serious adverse event in each group.

CONCLUSIONS Improvements in pain and pain-related disability associated with osteoporotic compression fractures in patients treated with vertebroplasty were similar to the improvements in a control group. (ClinicalTrials.gov number, NCT00688222.)

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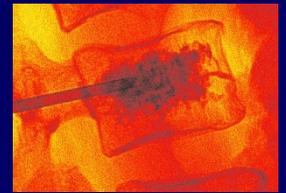
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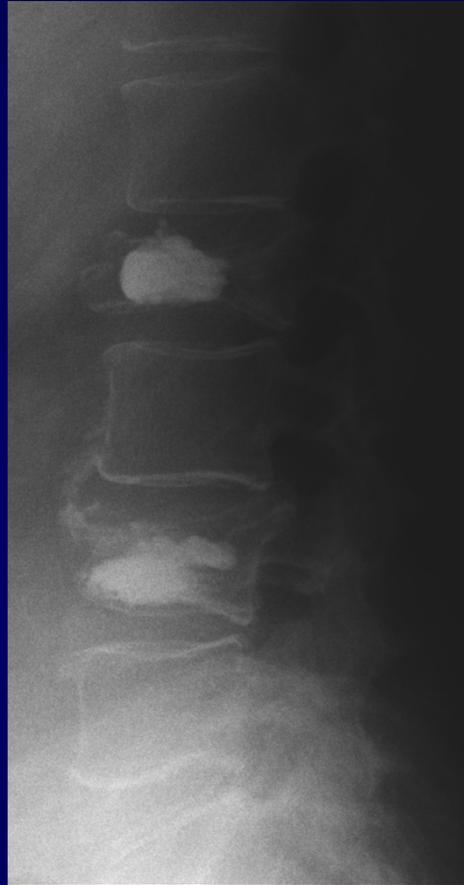


Vertebroplastie ?

Erfahrungen bei Osteoporose



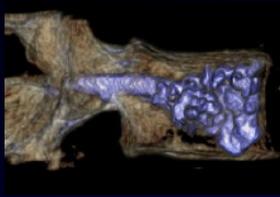
01.10.2007



05.10.2007

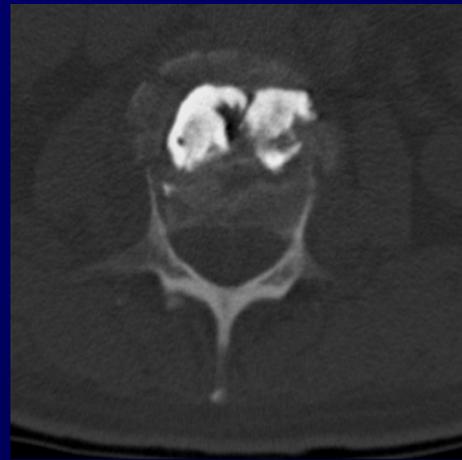
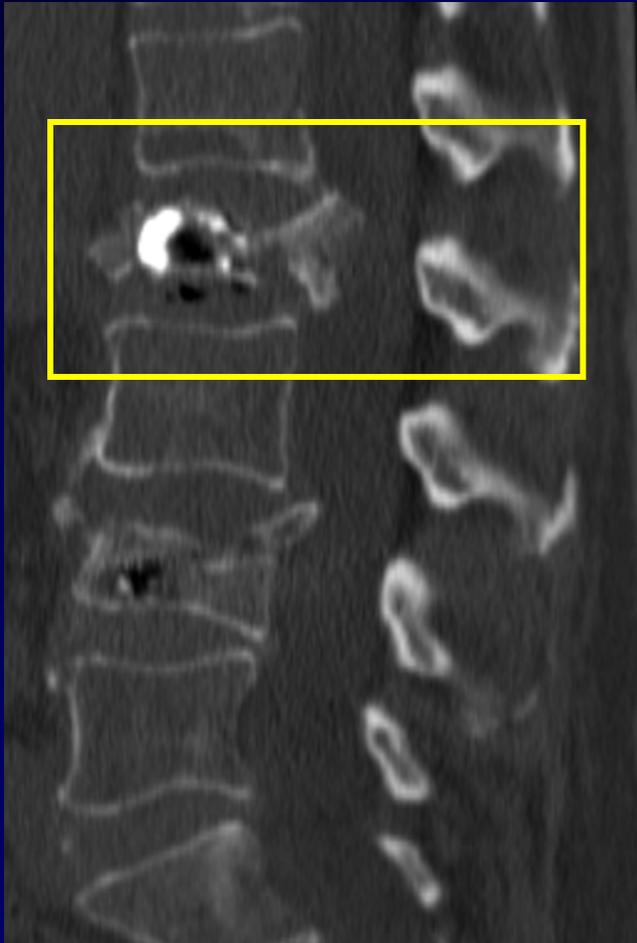


15.10.2007



Vertebroplastie ?

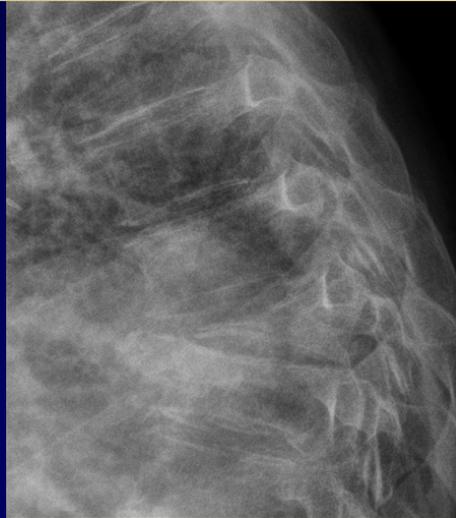
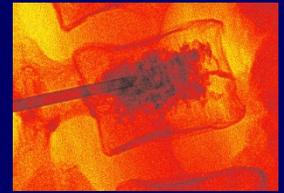
Erfahrungen bei Osteoporose



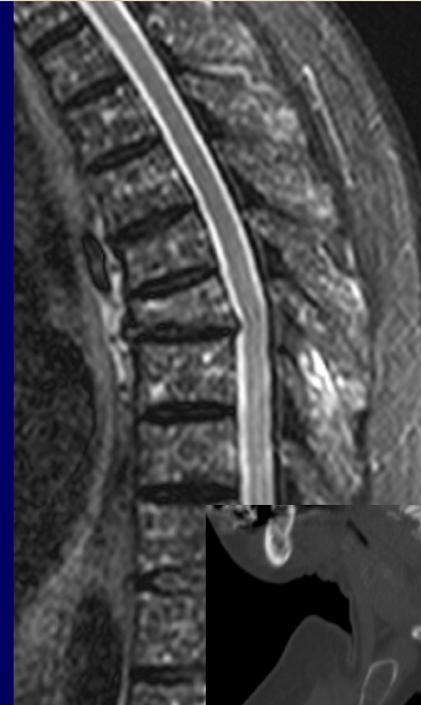
CT 17.10.2007

Tumorschmerz - Vertebroplastie

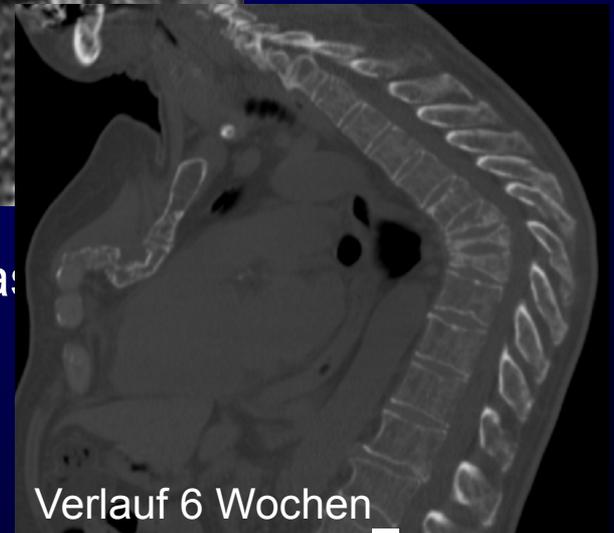
setzen wir interventionelle Verfahren zu selten ein?



Verlauf 1 Monat



73 a Pla



Verlauf 6 Wochen

73 a NSLC, Radiatio

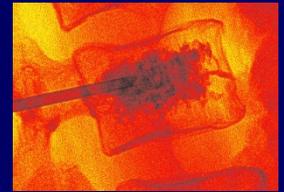
VERTEBROPLASTIE

INDIKATION (n= 240 Patienten / 527 Wirbelkörper)

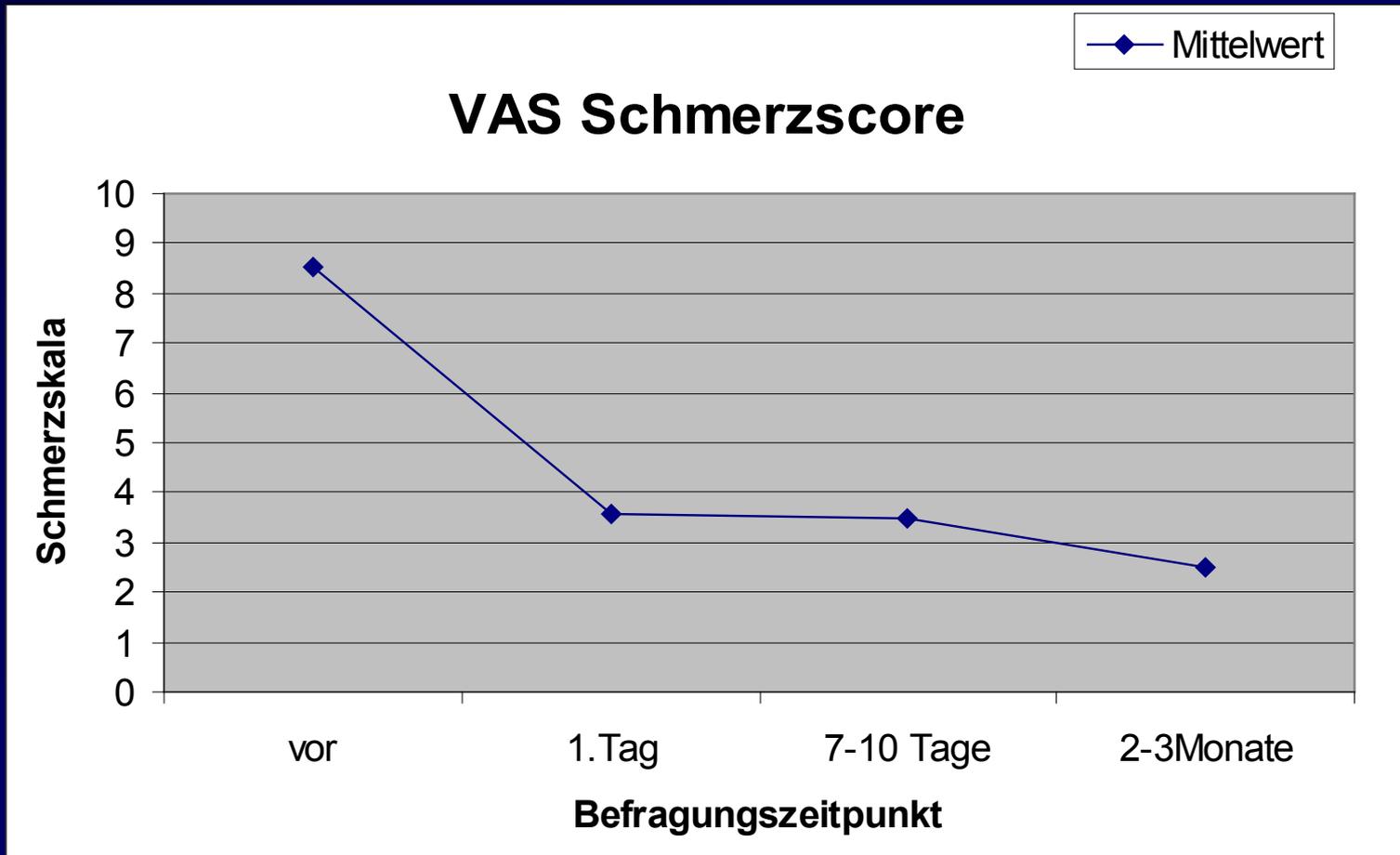
- **126** **Metastase**
- **59** **Osteoporose**
- **21** **Hämangiom**
- **30** **Plasmozytom**
- **4** **Lymphom**

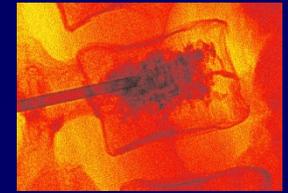


VERTEBROPLASTIE



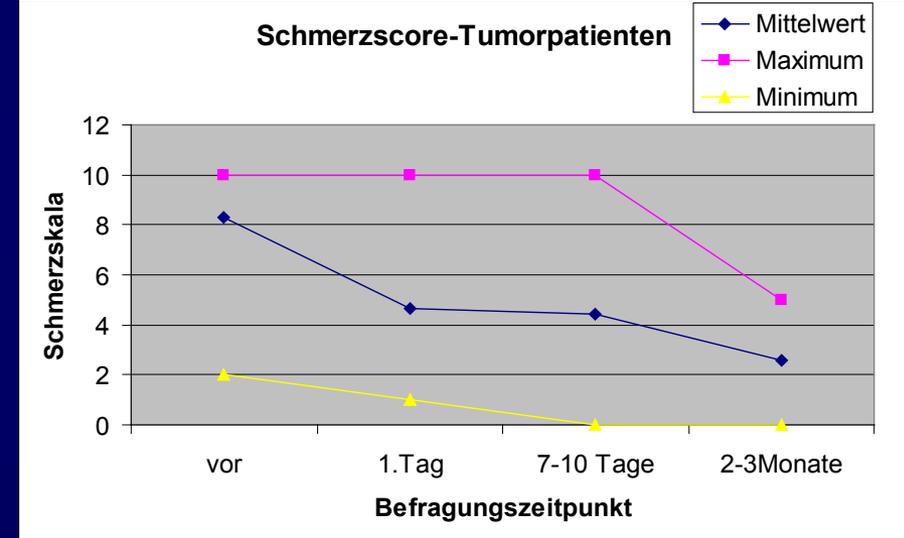
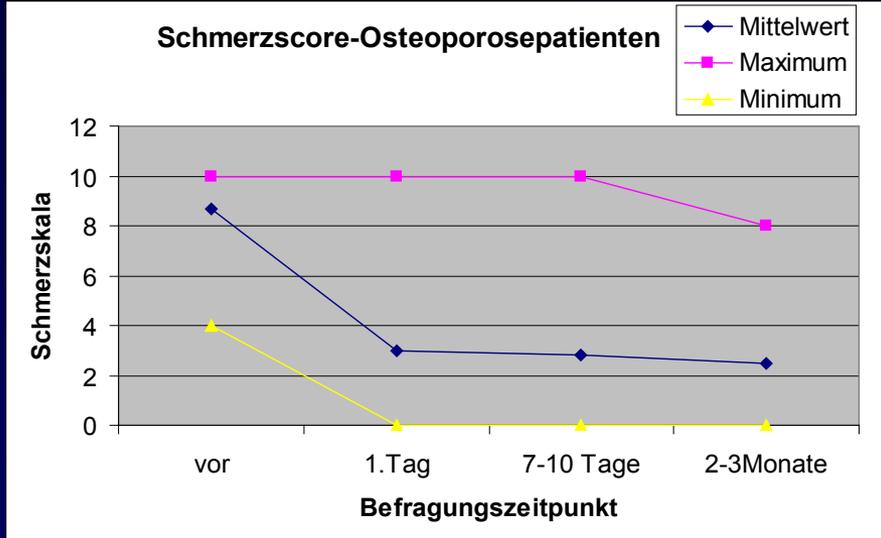
ERGEBNISSE II (n= 30 Patienten / 51 Wirbelkörper)





VERTEBROPLASTIE

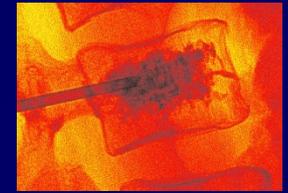
ERGEBNISSE II (n= 30 Patienten / 51 Wirbelkörper)





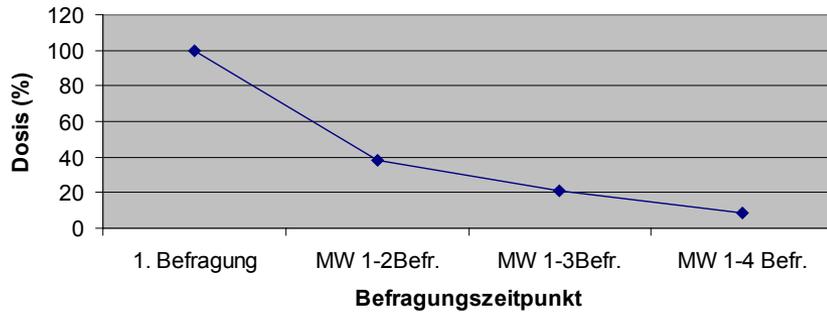
VERTEBROPLASTIE

ERGEBNISSE III - Schmerzmedikation



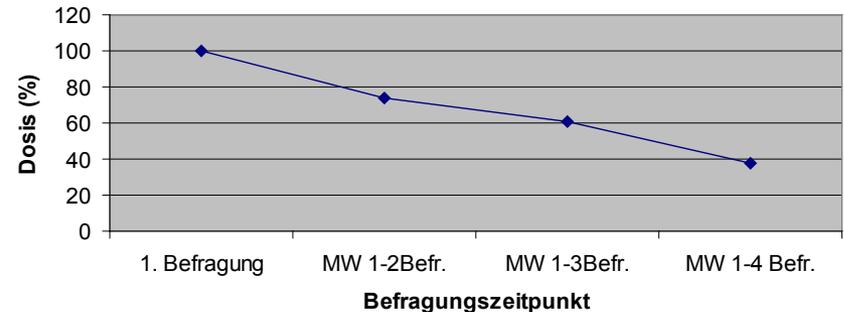
Analgetika-Osteoporosepatienten

◆ Dosis (%)



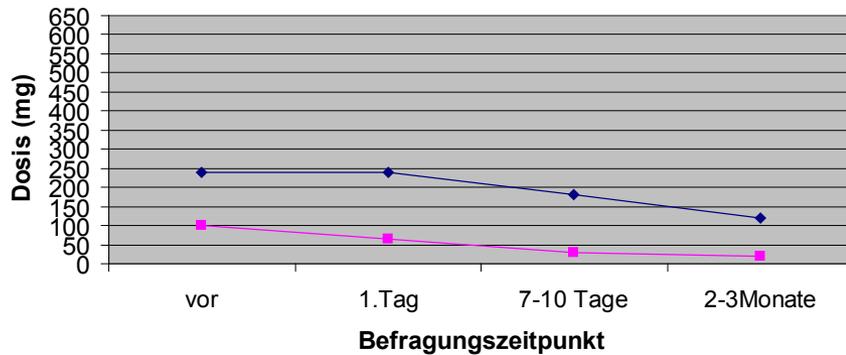
Analgetika-Tumorpatienten

◆ Dosis (%)



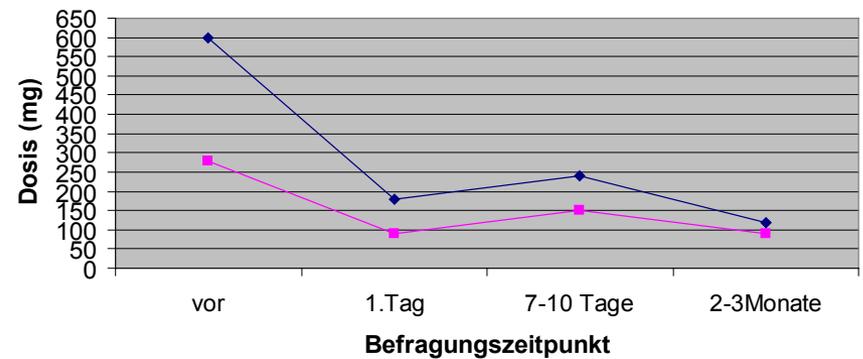
Morphindosis-Osteoporosepatienten

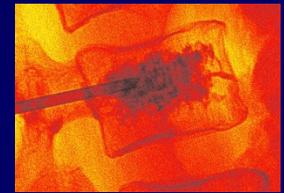
◆ Mittelwert
◆ Maximum



Morphindosis-Tumorpatienten

◆ Mittelwert
◆ Maximum

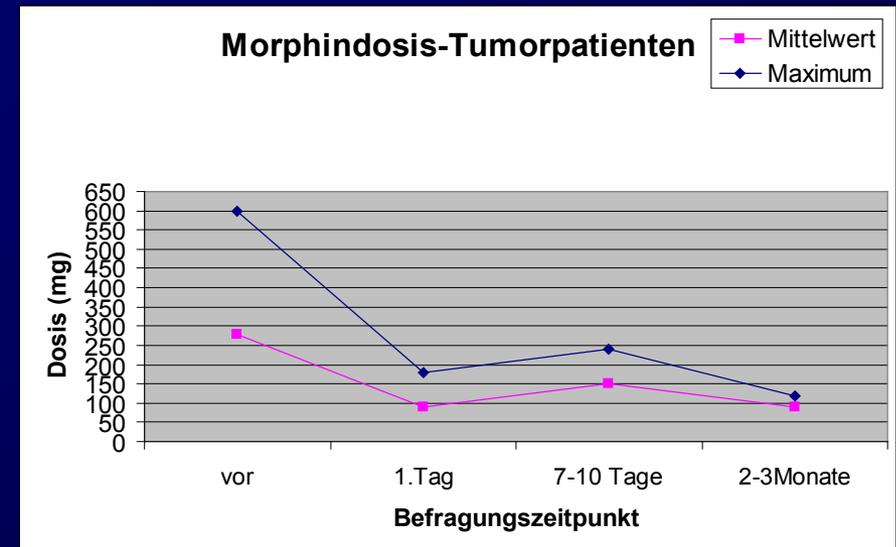
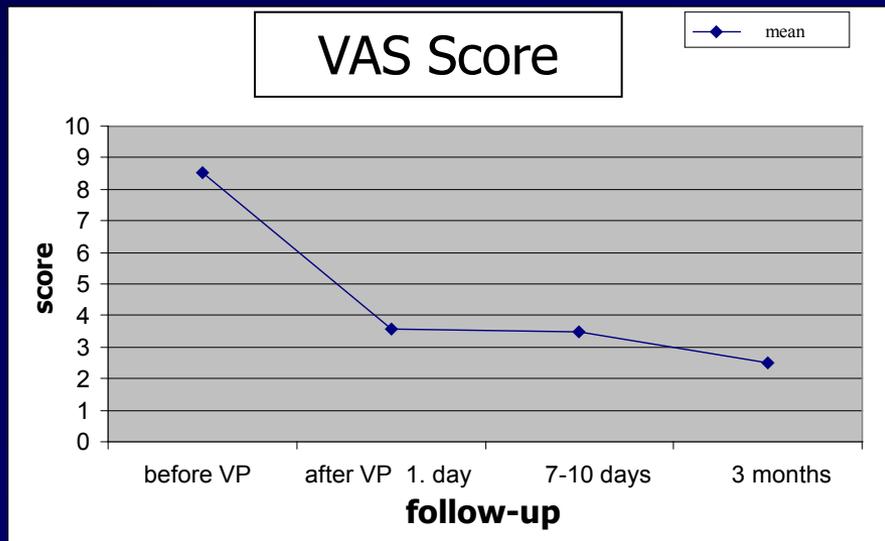


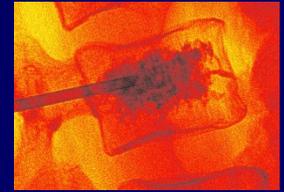


Tumorschmerz - Vertebroplastie

setzen wir interventionelle Verfahren zu selten ein?

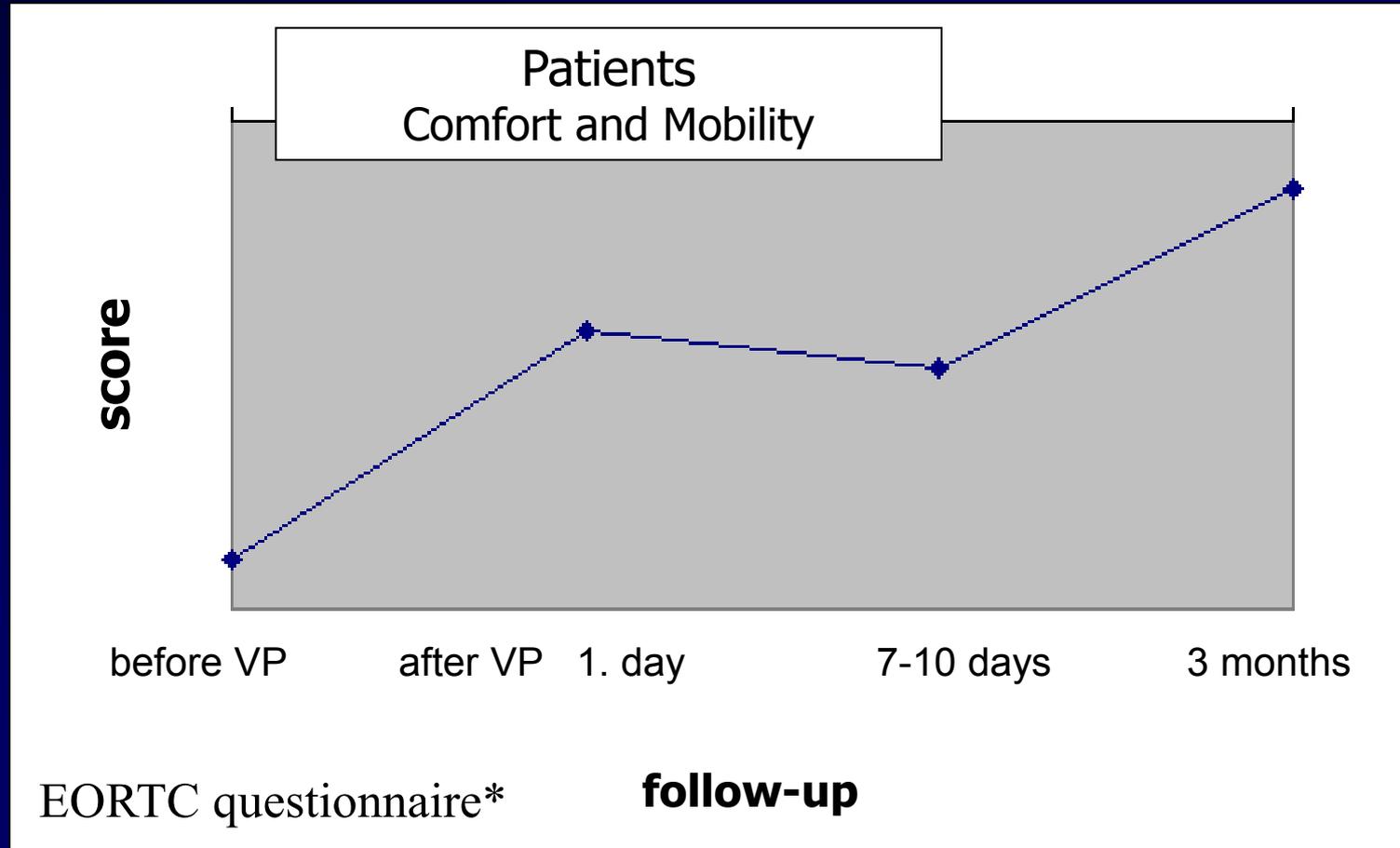
- Mean VAS score at baseline was 8.53 and 3.58 at the first day, 3.48 at one week and 2.5 at three months after VP
- The mean morphium-dose decreased from 170 mg/d at baseline to 37 mg/d at the end of follow-up
- In 9/12 pts obstipation decreased – use of laxative agents increased



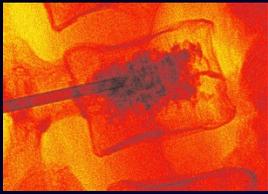


Results

VP: Pain reduction and its effect on systemic pain medication

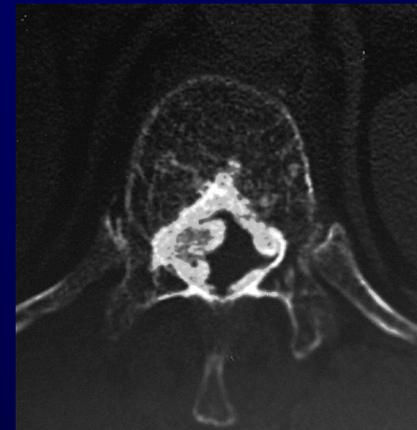
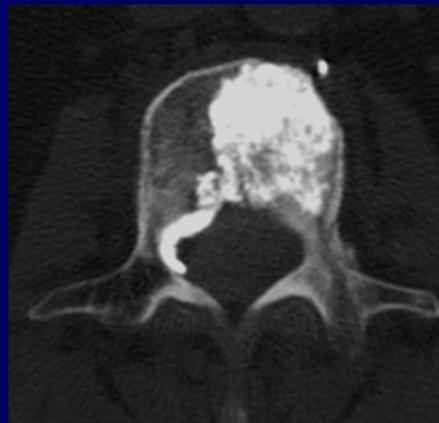
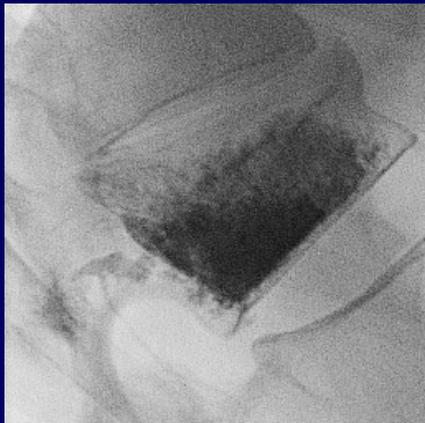
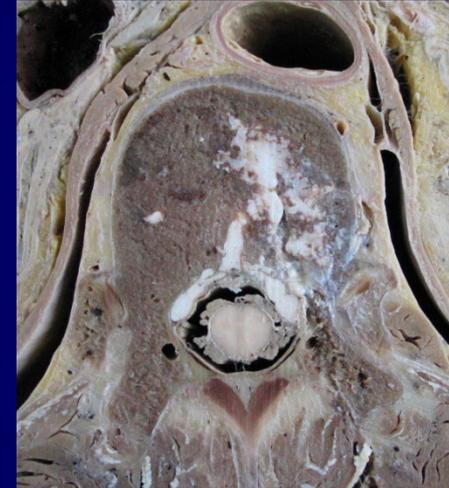
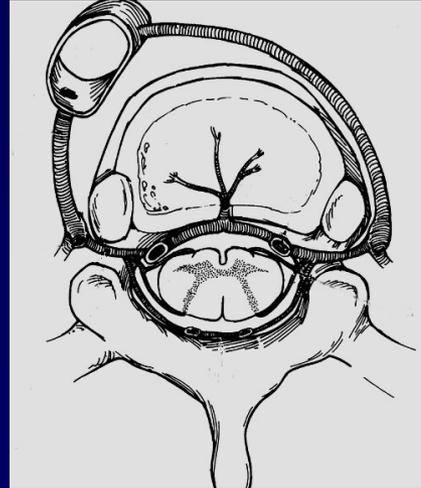
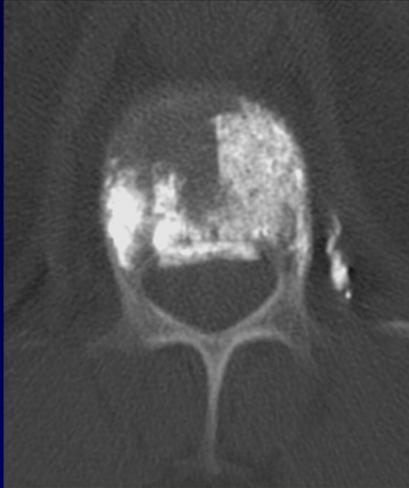


*quality of life - physical condition improved from 3,4 before to 5,7 after



VERTEBROPLASTIE

“ Epidural cement-leakage ”



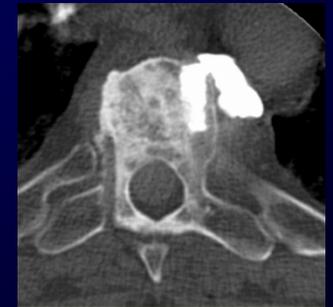
Relative Kontraindikation: Vertebroplastie

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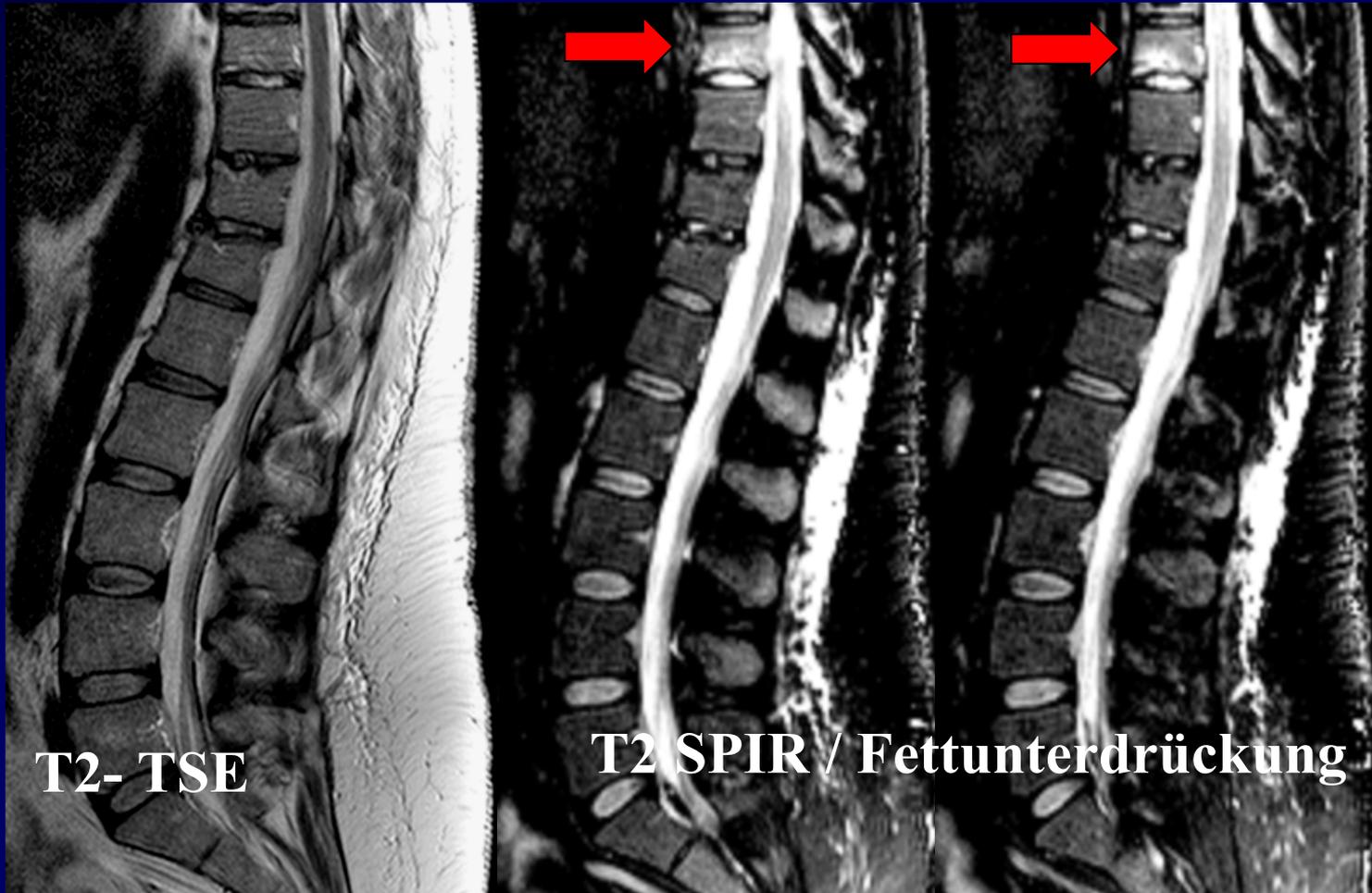
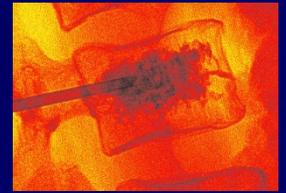
Leitlinien der Deutschen Röntgengesellschaft zur Vertebroplastie



- Patienten unter 60 a
- Vorwölbung / Beteiligung der WK-Hinterkante
- Epidurale Tumorausdehnung
- Radikuläre Symptomatik
- Behandlung von mehr als 3 WK
- Manifeste bakterielle Infektion
- Osteoplastische Metastasen →



Indikation: Vertebroplastie

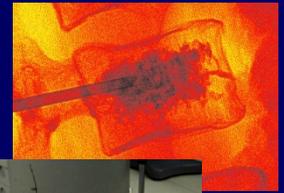


T2- TSE

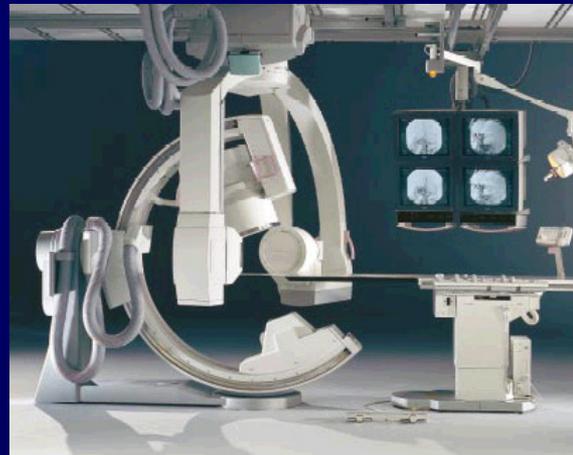
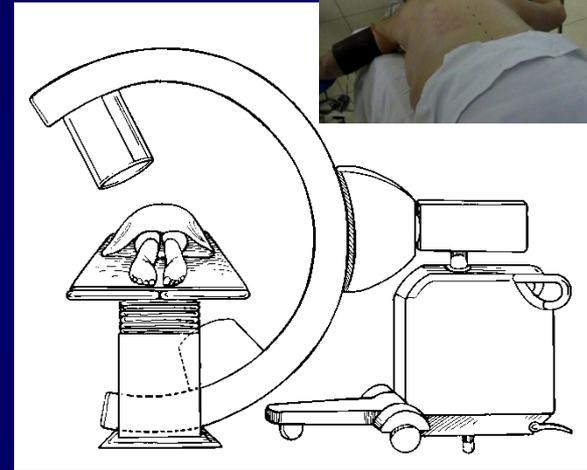
T2 SPIR / Fettunterdrückung



Technik: Vertebroplastie Transpedikulärer Zugang



- Bauchlagerung
- frontaler Strahlengang
- C-Bogen 10-20° aus der ap-Projektion schwenken

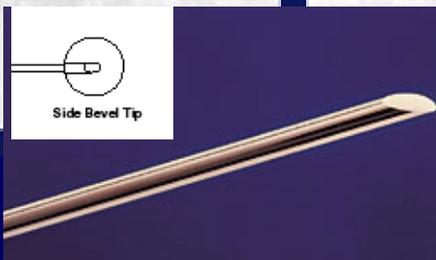
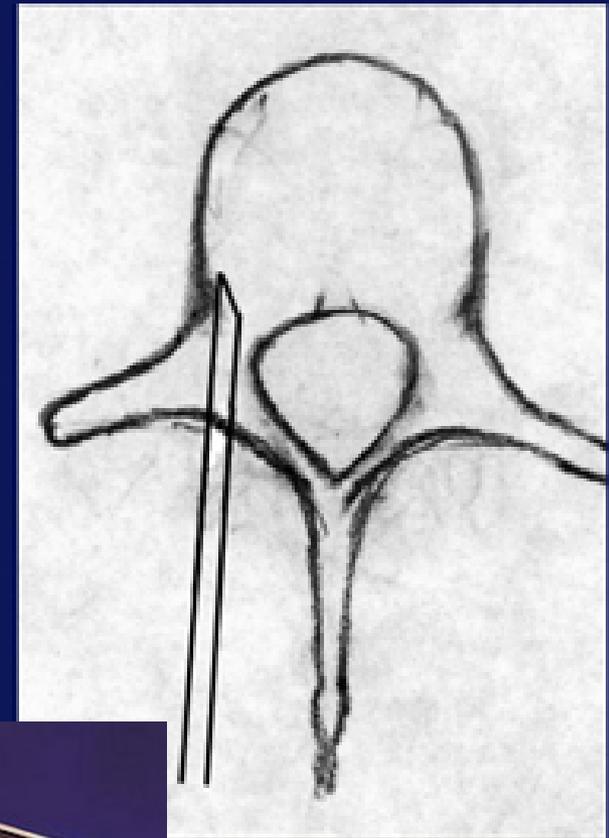
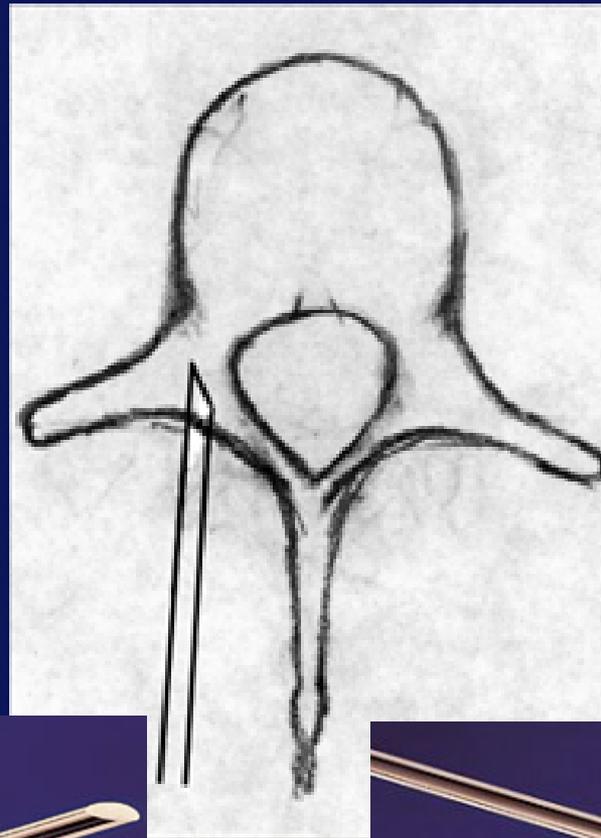
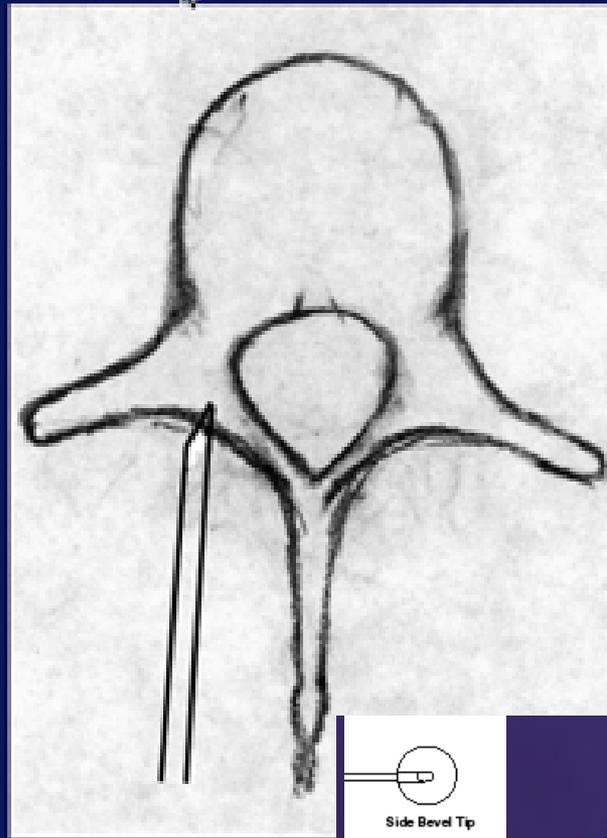


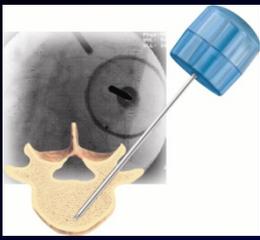


Technik: Vertebroplastie Transpedikulärer Zugang

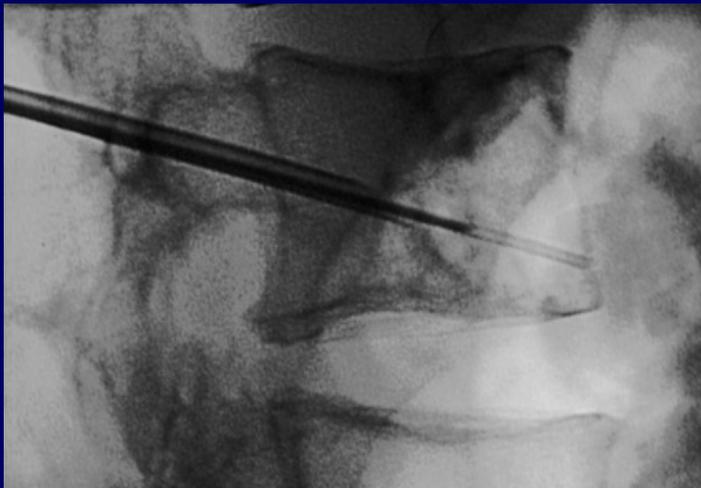
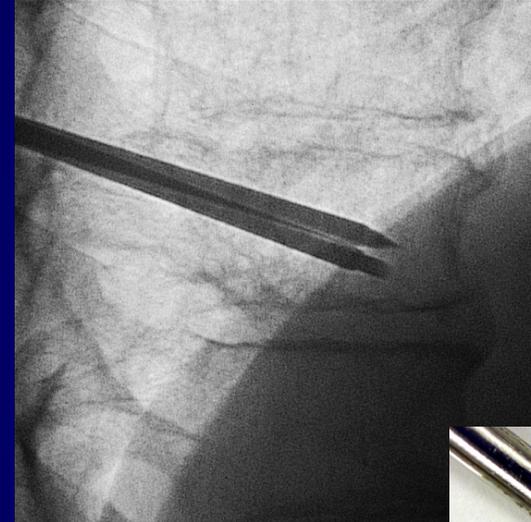
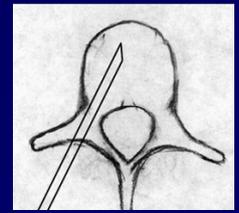


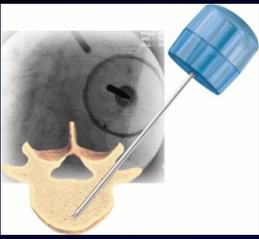
Side Bevel Tip: Schliff der Knochenbiopsiekanüle beim Einbringen beachten



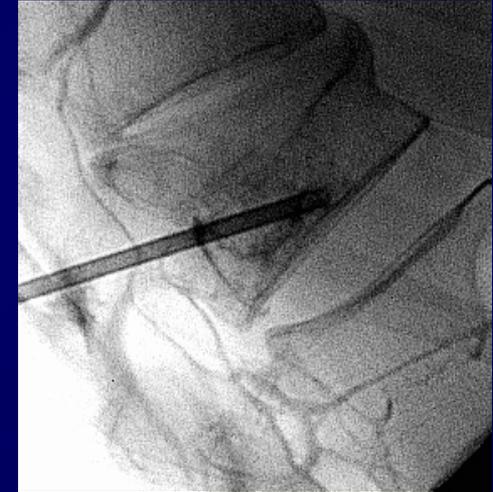
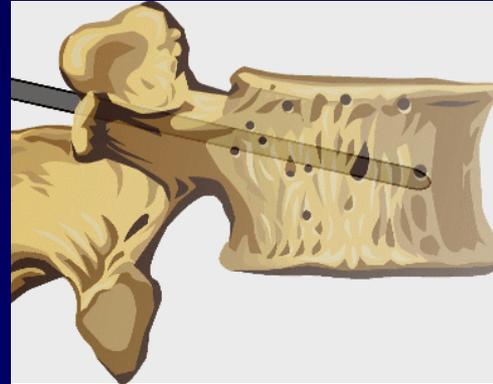
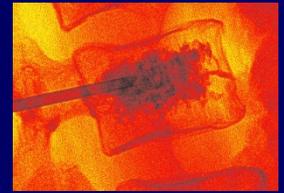


Technik: Vertebroplastie Transpedikulär - Biopsie

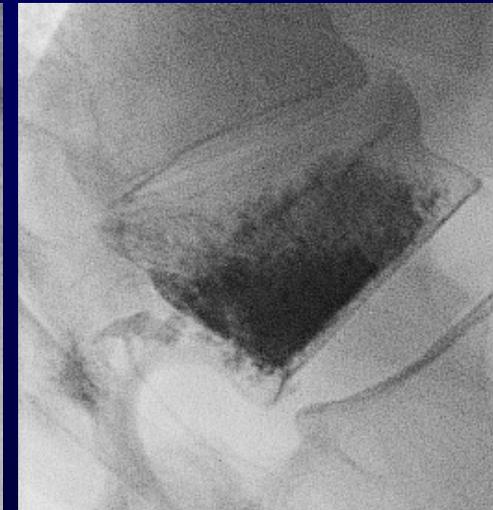
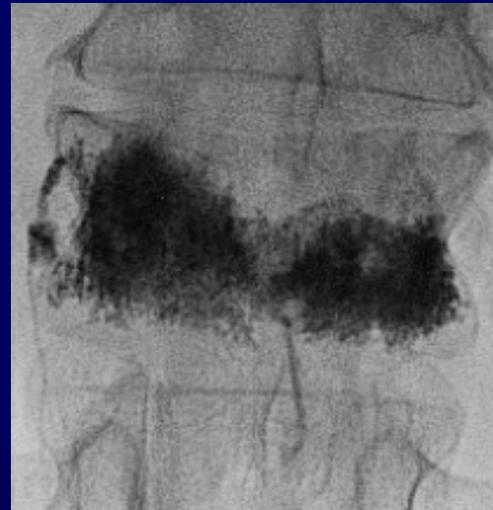


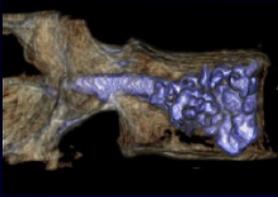


Technik: Vertebroplastie Zementapplikation



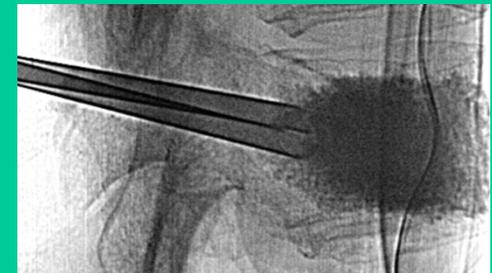
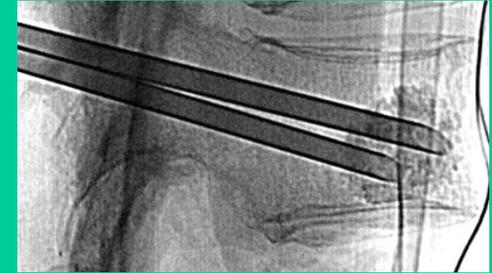
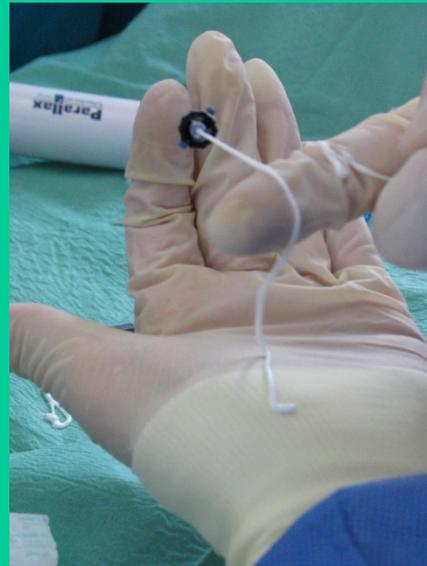
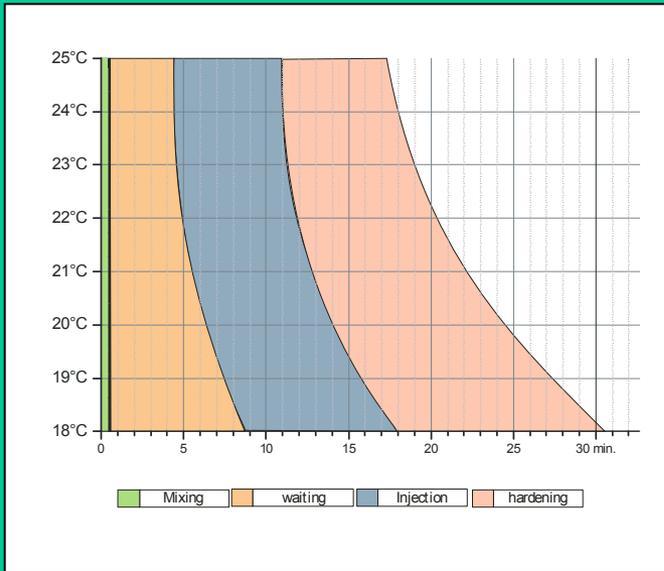
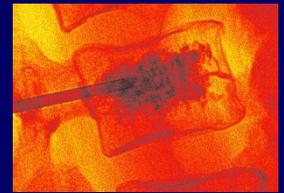
- Injektion des Knochenzementes unter Durchleuchtungskontrolle
- Anpassung des Injektionsdruckes





Technik: Vertebroplastie

Zement Polymerisation



A Anmischphase



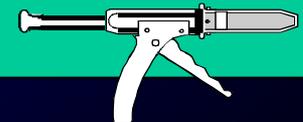
B Ruhephase

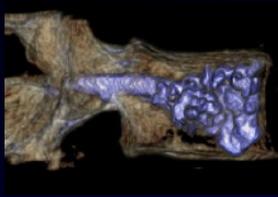


C **Verarbeitungsphase**



D Aushärtungsphase





Vertebroplastie ?

Erfahrungen bei Metastasen



ORIGINAL RESEARCH ■ VASCULAR AND INTERVENTIONAL RADIOLOGY

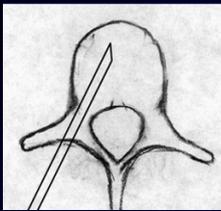
Percutaneous Vertebroplasty for Spinal Metastases: Complications¹

Héctor Manuel Barragán-Campos, MD, MSc
Jean-Noël Vallet, MD, PhD
Daouda Lo, MD
Evelyne Cormier, MD
Beatrix Jean, MD
Michelle Rose, MD
Pascal Astagneau, MD, PhD
Jacques Chiras, MD

Purpose:	To retrospectively evaluate complications of percutaneous vertebroplasty (PV) performed with polymethylmethacrylate cement to treat pain in patients with metastases to the spine.
Materials and Methods:	This study had institutional review board approval; patient informed consent for the review of records and images was not required. In 2 years, 117 patients (38 men [32.5%] and 79 women [67.5%]; mean age, 58.2 years) underwent 150 fluoroscopy-guided PV procedures to treat 304 vertebrae. Spinal metastases included osteolytic, osteoblastic, and mixed lesions. Complications were characterized as local or systemic. Evaluated data included immediate imaging findings (on radiographs and computed tomographic scans) and clinical findings at 30-day follow-up. χ^2 or Fisher exact testing was performed for univariate analysis of variables.
Results:	The primary cancers were breast cancers (45.3%), lung cancers (14.5%), myeloma (7.7%), or other cancers (32.5%). Among the 423 cement leakages identified, 332 (78.5%) were vascular and 91 (21.5%) were nonvascular. Vascular leaks were classified as venous spinal leaks, paravertebral and foraminal plexus leaks, and leaks to the vena cava, while nonvascular leaks included puncture trajectory leaks, paravertebral soft tissue leaks, and diskal leaks. Patients with nonvascular leaks were asymptomatic.

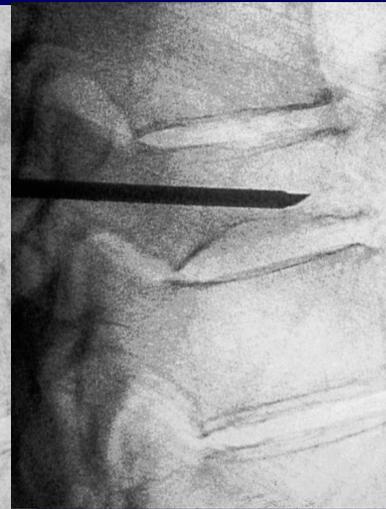
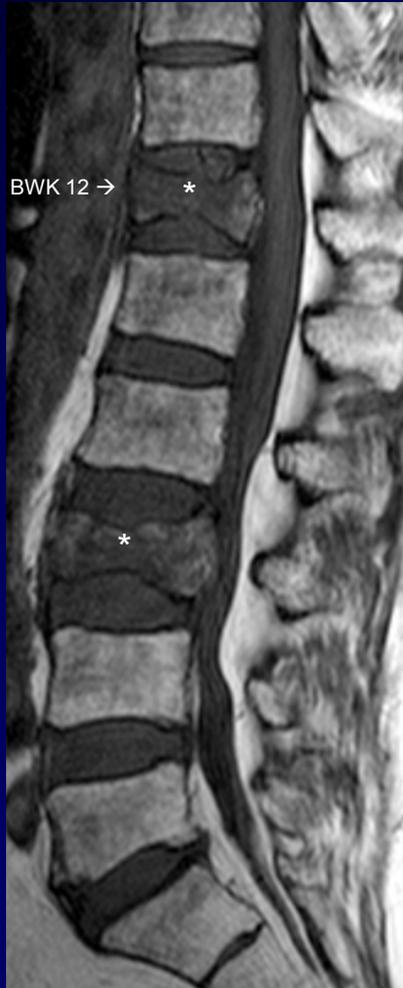
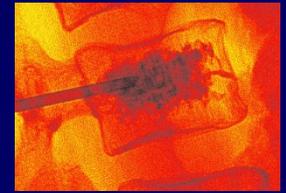
Radiology

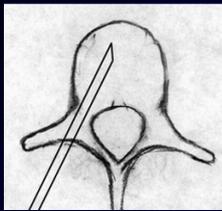
Despite numerous technical incidents (leaks), PV-induced complications were rare, leading to the hypothesis that systemic complications are a consequence of intravascular leakage while local complications are a consequence of cement-related irritation, compression and/or ischemia, and/or needle-induced trauma.



Vertebroplastie

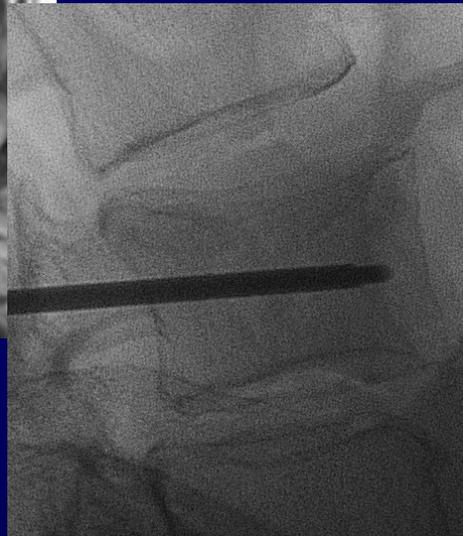
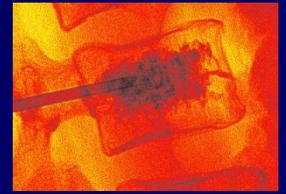
Plasmozytom BWK 12 und LWK 3

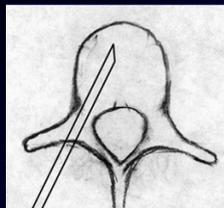




Vertebroplastie

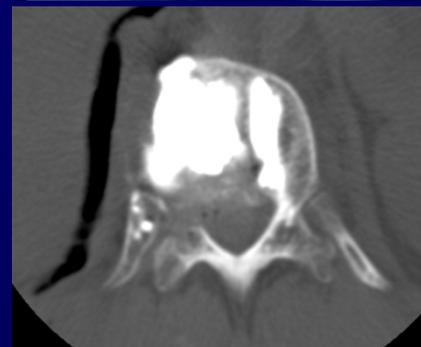
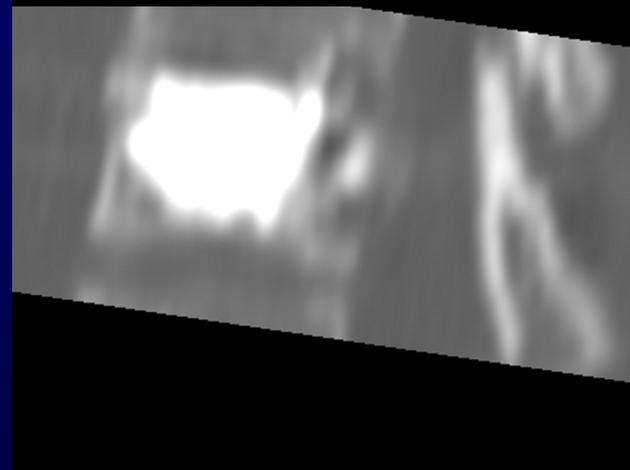
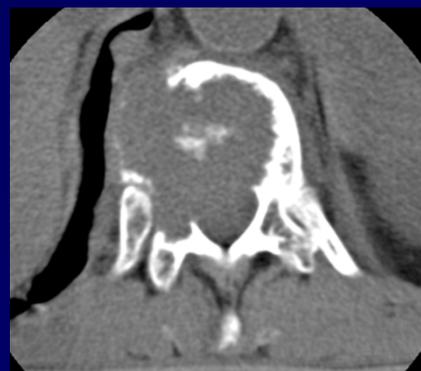
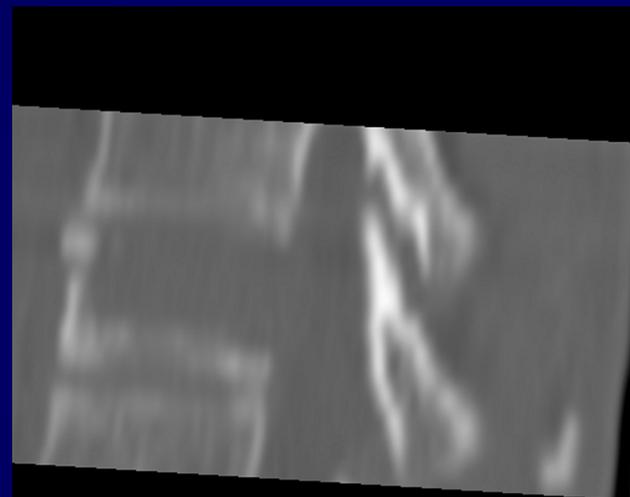
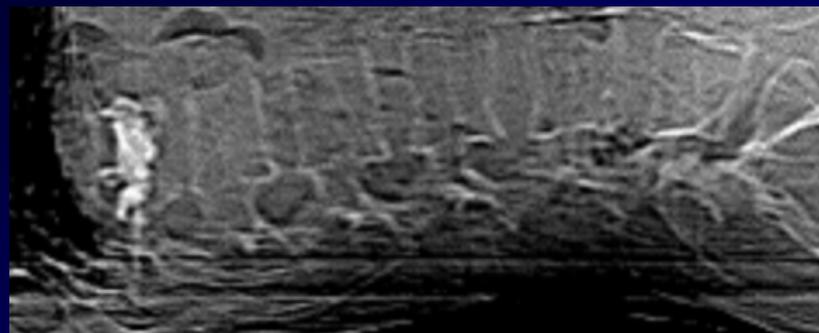
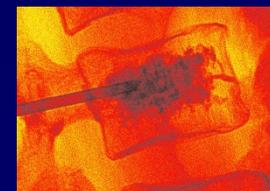
Metastase LWK 4





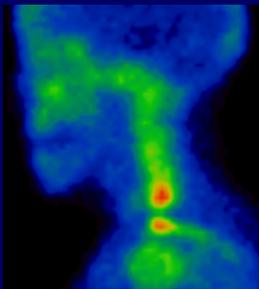
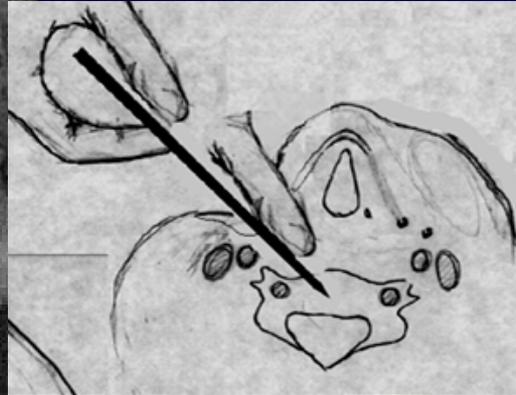
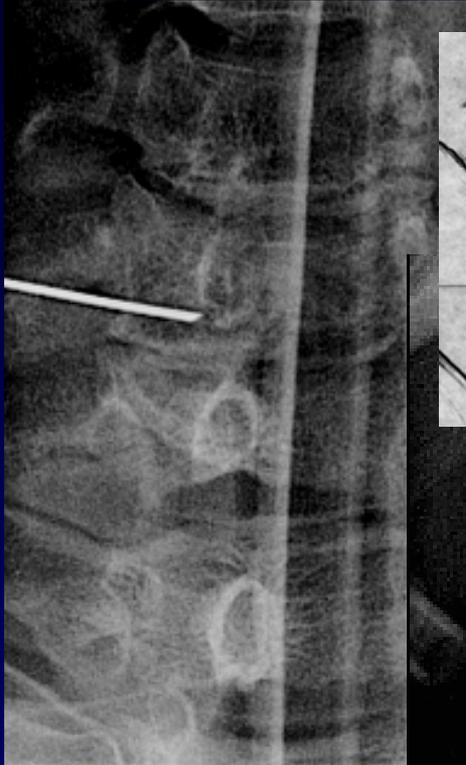
Technik: Vertebroplastie

osteolytische Metastase



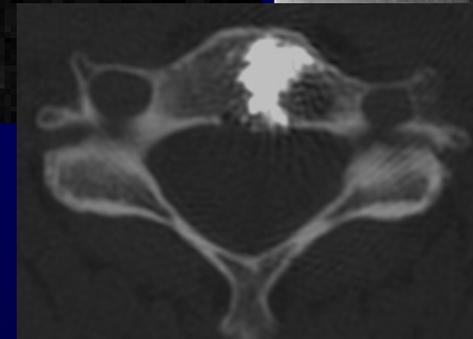
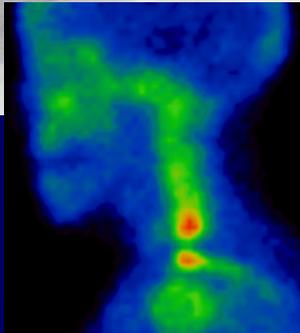
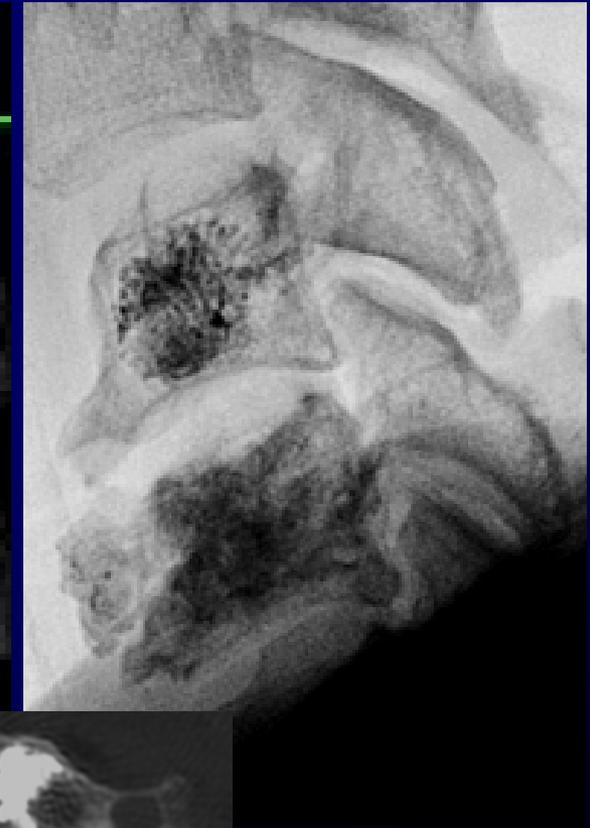
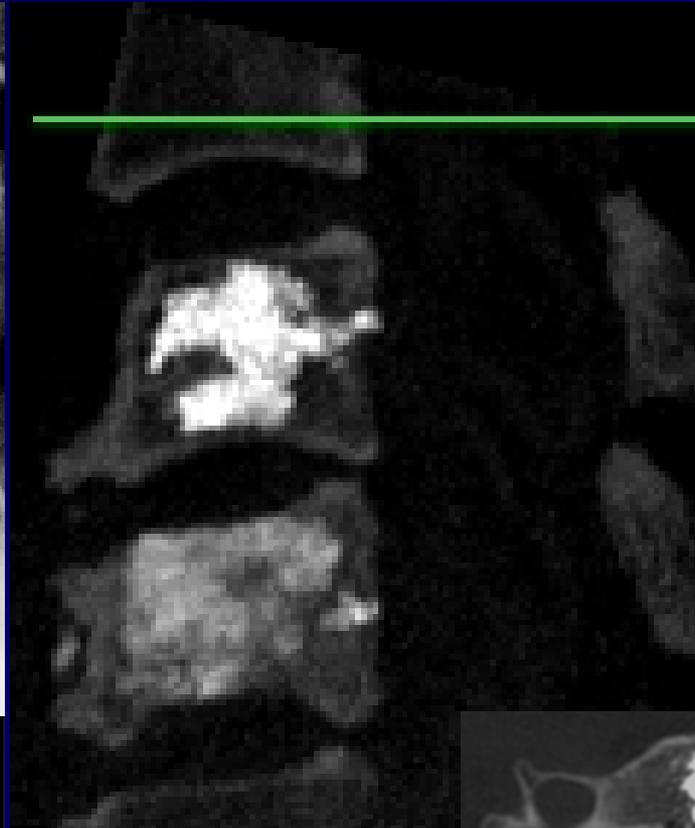
Metastase HWK 5, 6 - Anterolateraler Zugang

Vertebroplastie im Bereich der Halswirbelsäule



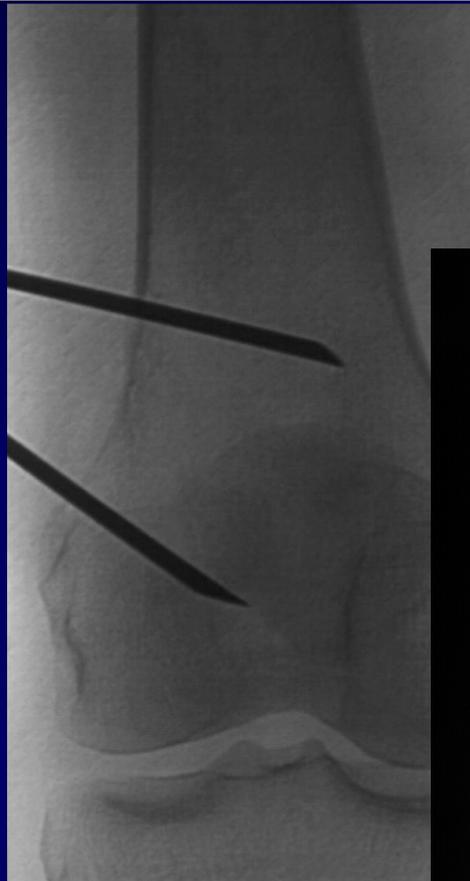
Metastase HWK 5, 6 - Anterolateraler Zugang

Vertebroplastie im Bereich der Halswirbelsäule

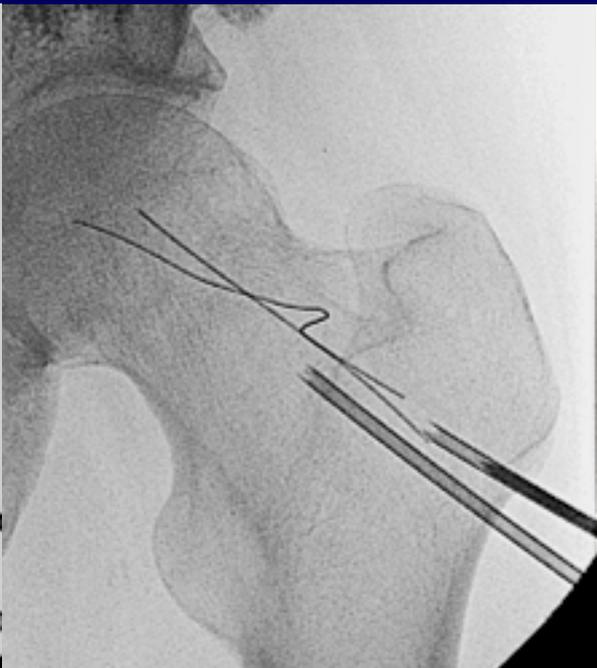


Technik: Osteoplastie

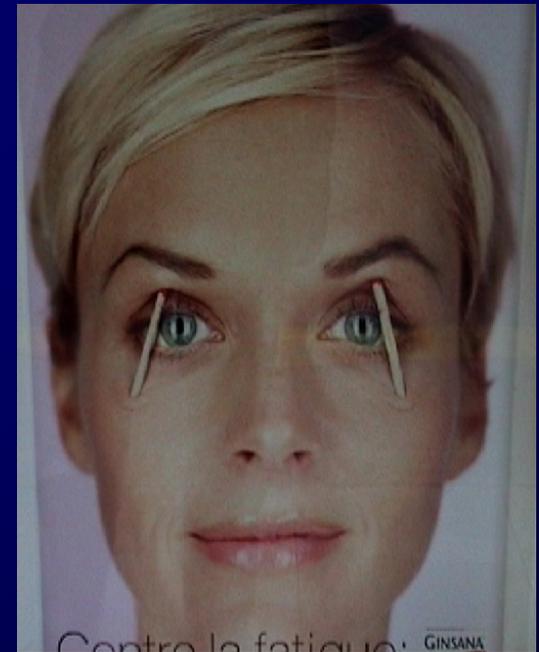
osteolytische Metastasen und maligne Tumoren



46 a, weibl. Osteoplastie rechts dist Femur
metastasiertes Uterus Sarkom



- ✓ Sichere, minimal invasive Therapieoption zur
 - Schmerzreduktion
 - Stabilisierung
 - Mobilisierung
- ✓ Palliativer Therapieeffekt bei Metastasen
- ✓ Symptomatischer Therapieeffekt

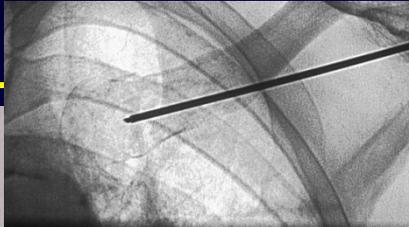


Quo vadis ?



Thermokoagulation (RFA)

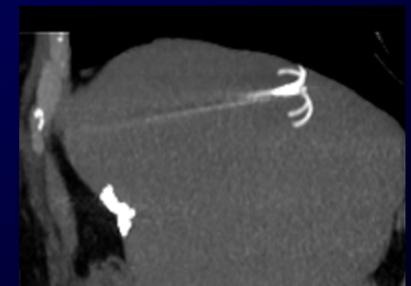
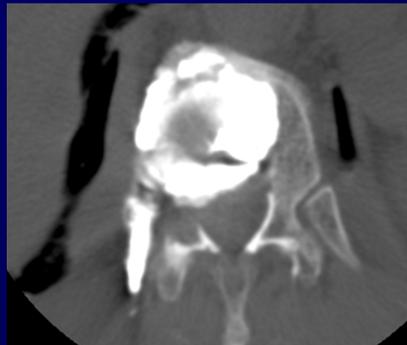
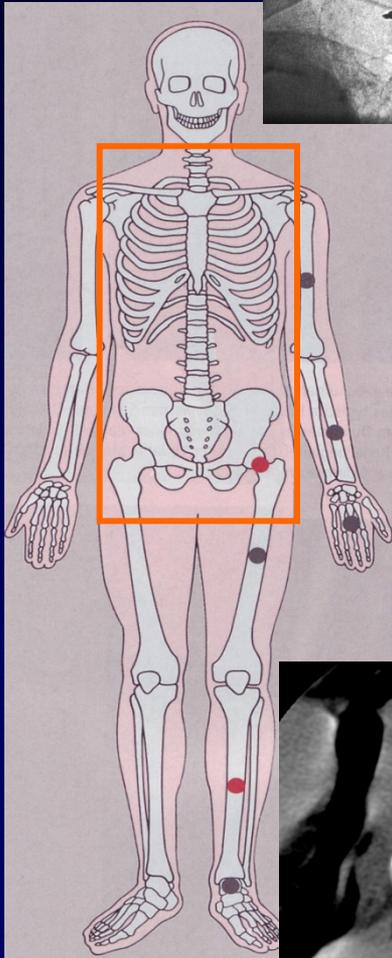
Mikrowelle / HiFU



RFA Nierenzellkarzinom

Maligne Läsionen

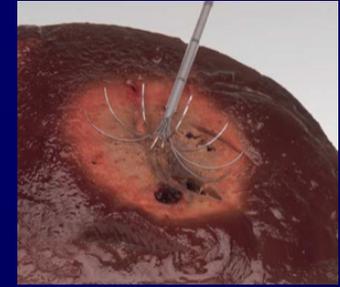
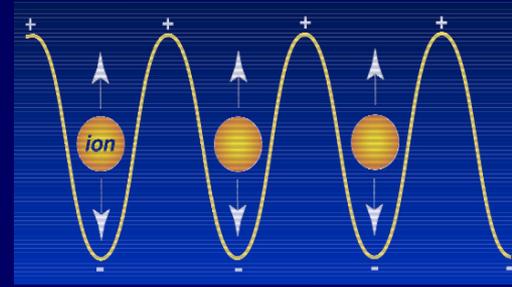
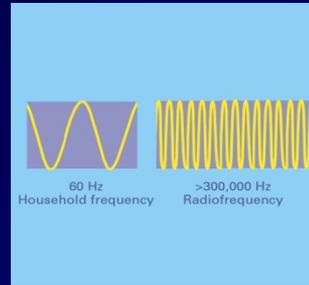
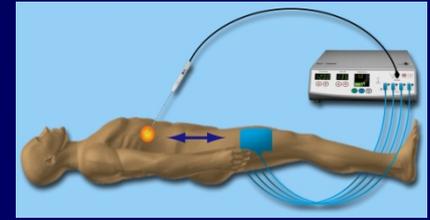
→ palliative Therapie
osteolytische Metastasen



RFA Lebermetastase



Radiofrequenzablation Prinzip



Hochfrequenz-Wechselstrom (ca. 460 kHz)

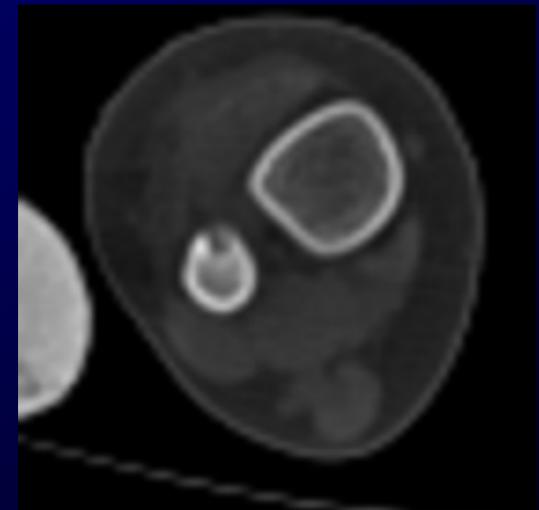
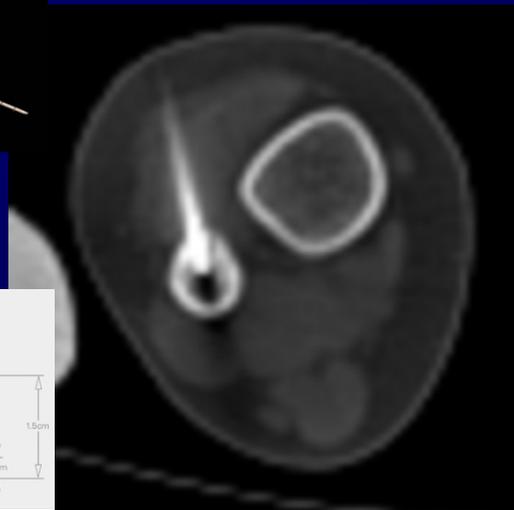
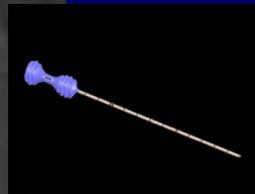
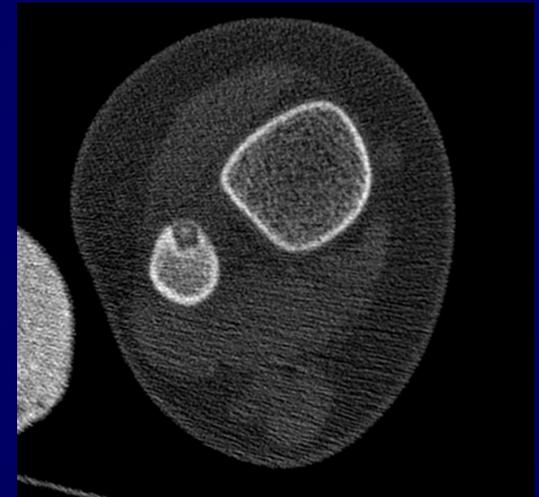
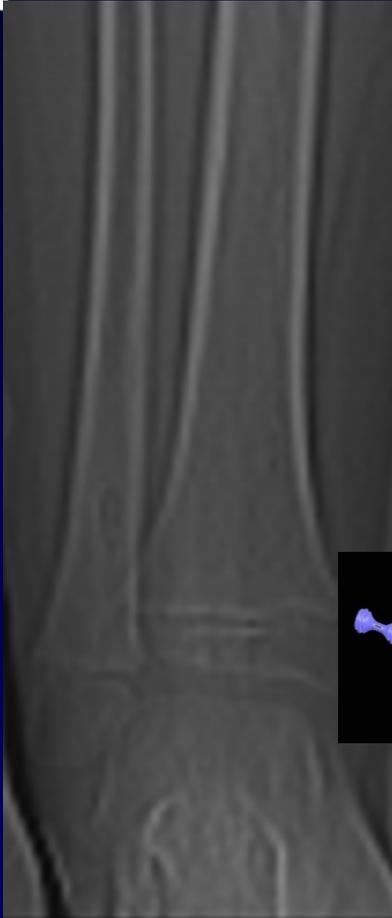
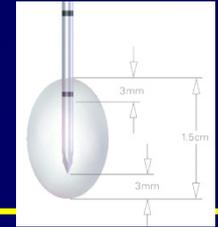
Induktion von Ionenbewegungen durch die elektromagnetische Energie
Wärmeentwicklung im Tumorgewebe \longrightarrow Koagulationsnekrose

Temperatur: 60 - 100° (vor der Karbonisation)

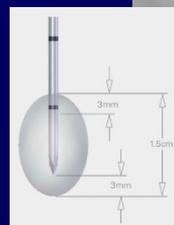
Temp > 60° - Denaturierung von Eiweiss

Temp > 100° Karbonisation verhindert die Ausbreitung der Nekrose
(Verkohlung erhöht den Widerstand)

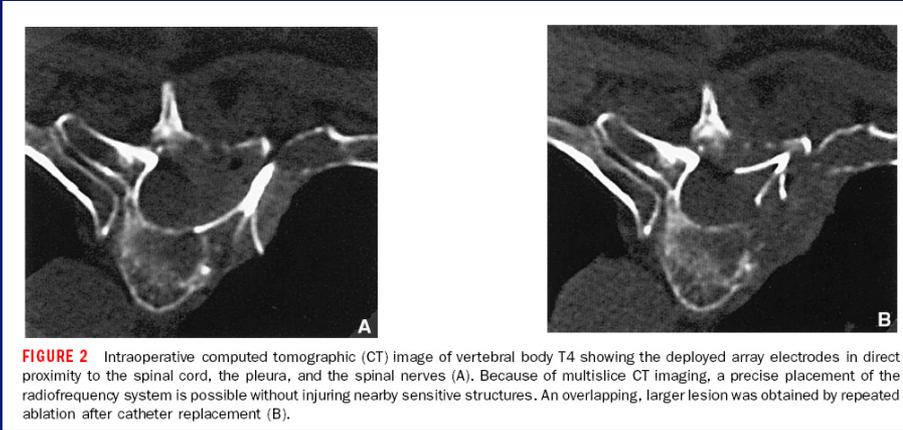
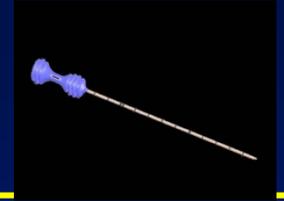
Radiofrequenzablation Knochen Röhrenknochen - Fibula



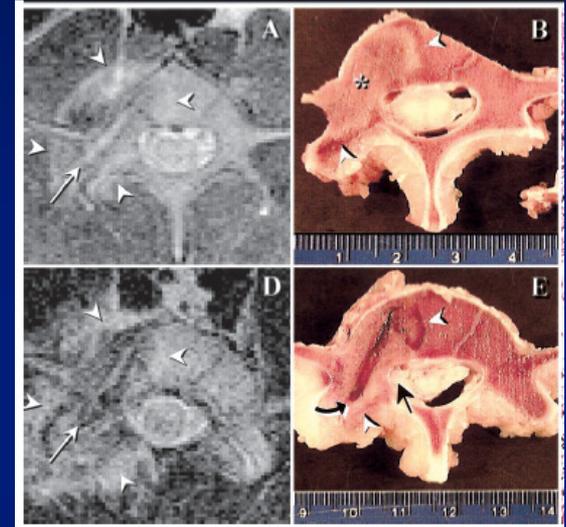
5 jähriger Patient



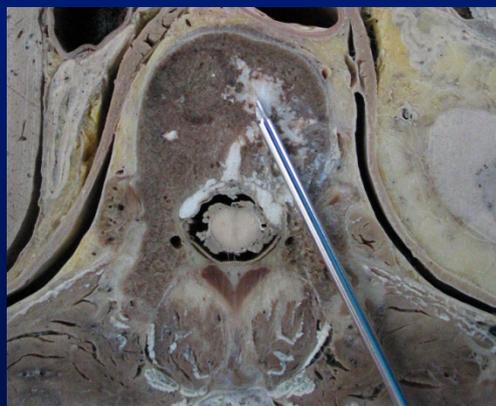
RFA Knochen / Wirbelkörper



Grönemeyer, et al. The Cancer Journal 2002;8: 33-39



Nour, et al. Radiology 2002;224: 452-462



RFA Knochen / Wirbelkörper Metastasen

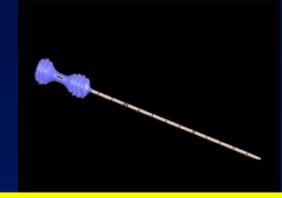


TABLE 1 Effect of Radiofrequency Ablation in 10 Patients with Unresectable Spinal Tumors

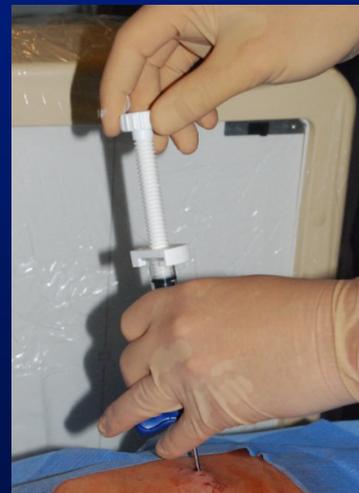
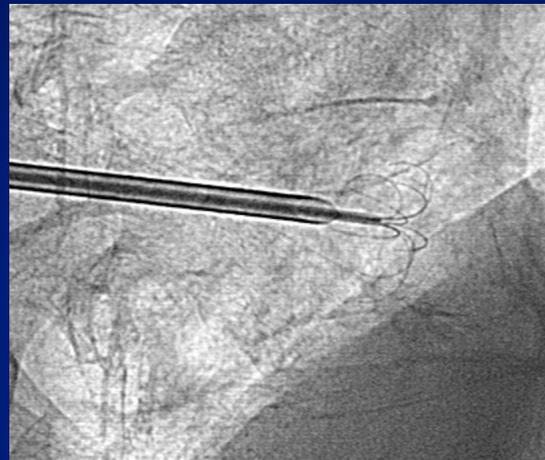
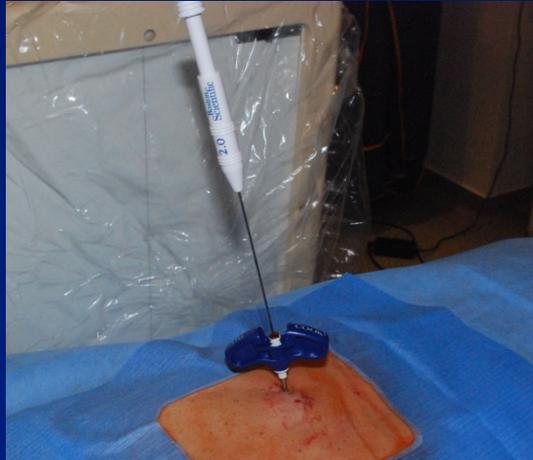
Patient No.	Age	Primary Tumor	Treated Level	No. of RFAs	Vertebroplasty	Follow-up (Months)	Pain		Percentage Relative Pain Reduction	Percentage of Pain-Related Disability Reduction ^a
							Before Therapy ^a	Pain Follow-up ^a		
1	63	Melanoma	T3, T4, T10, T11	4	Yes	5	90	50	44	62.5
2	76	Renal Cell	L3	1	Yes	2	50	0	100	12.6
3	66	Prostate, Rectum	Sacral Bone	3	No	4	10	0	100	16.6
4	57	Mammary	T12	1	No	3	50	80	-60	-16.6
5	62	Mammary	L4, L5	5	No	11	100	70	30	75
6	66	Multiple Myeloma	L3	1	Yes	6	50	10	80	12.5
7	65	Renal cell	T8	1	No	10	70	10	86	25
8	60	Uterine Cervix	L4, L3	2	Yes	3	100	10	90	45.8
9	71	Rectum, Adeno	Sacral Bone, L5	2	No	6	50	30	40	12.5
10	58	Melanoma	T10	1	No	8	25	0	100	25

^aData on pain was assessed with a Visual Analogue Scale; data on back pain related disability was assessed with the Hannover Functional Ability Questionnaire (FFbH-R). A change of 12 percentage points on the FFbH-R has been shown to be clinically relevant by Kohlmann et al.¹³



Vertebroplastie nach RFA

osteolytische Metastasen Nierenzellkarzinom



RFA Knochen Metastasen



Table 1. Lesion characteristics and treatments in 17 patients

Patient. No./age/sex	Primary neoplasm	Treated location	Lesion size (mm)	Pre-RT (Gy)	RF No.	Temperature (°C)	Total RF time (min)
1/68/M	Liver	Th-spine	22 × 20 × 30	50	1	67	5
2/64/M	Renal	Humerus	41 × 37 × 54	39	2	65, 70	13
3/55/M	Liver	L-spine	53 × 50 × 60	39	1	70	5
4/75/M	Bladder	Ilium	49 × 45 × 45	39	1	60	7
		Ischium	39 × 39 × 33	39	1	80	7
5/81/F	Thyroid	Ilium	35 × 34 × 30	(—)	1	96	7
		Ilium	51 × 44 × 50	(—)	1	87	7
6/65/M	Renal	Femur	21 × 18 × 55	(—)	2	85, 83	10
		Maxilla	30 × 27 × 24	(—)	1	55	1
7/76/M	Liver	Ilium	47 × 23 × 45	39	2	85, 86	7
8/59/M	Renal	Ilium	95 × 56 × 135	15	4	78, 82, 83, 66	20
8/2nd		Ilium	125 × 67 × 160	33	8	84, 87, 87, 84 75, 77, 81, 79	32
9/54/M	Lung	L-spine	25 × 25 × 25	39	1	83	5
10/54/M	Rectal	Sacrum	90 × 53 × 95	90	8	43, 47, 42, 44 48, 48, 45, 46	20
11/61/M	Liver	Mandible	60 × 56 × 51	(—)	4	67, 77, 78, 73	20
12/61/M	Liver	Ilium	37 × 37 × 34	(—)	1	70	4.5
13/65/M	Renal	Ischium	51 × 44 × 60	(—)	3	67, 62, 70	5.5
		Th-spine	45 × 38 × 45	39	1	89	3
14/61/M	Renal	Humerus	51 × 44 × 60	39	2	50, 73	8.5
		Sacrum	45 × 38 × 45	39	2	65, 70	5.5
15/77/M	Liver	Th-spine	50 × 35 × 40	50	1	73	3
		L-spine	43 × 41 × 45	40	2	99, 91	7
16/56/M	Bladder	Ilium	85 × 60 × 125	25	3	77, 72, 82	13

Abbreviations: RT: radiation therapy; Gy: Gray; RF: radiofrequency ablation.



RFA Knochen Metastasen

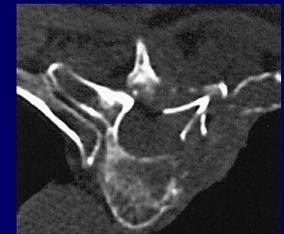


Table 2. Clinical results

Patient No.	Analgesic reduction	Relief achieved (days)	ADL post-Tx	Duration of pain relief (months)	Recurrence of pain	Outcome
1	Yes	1	NC	3	No	Dead
2	Yes	2	NC	30	No	Alive
3	No	1	NC	1	NA	Lost to follow
4	No	2	Sitting	1	No	Dead
5	No	1	NC	20	No	Alive
6	Yes	1	Walking	3	No	Alive
7	Yes	2	NC	9	No	Dead
8	No	2	NC	3	Yes	Dead
8 (2 nd)	No	3	Standing	1	Yes	Dead
9	Yes	1	NC	15	No	Alive
10	No	2	Sitting	0.5	Yes	Dead
11	No	2	NC	7	No	Dead
12	No	1	NC	5	No	Dead
13	No	2	NC	9	No	Alive
14	Yes	1	Sitting	7	No	Alive
15	No	1	NC	6	No	Alive
16	Yes	3	NC	4	No	Alive

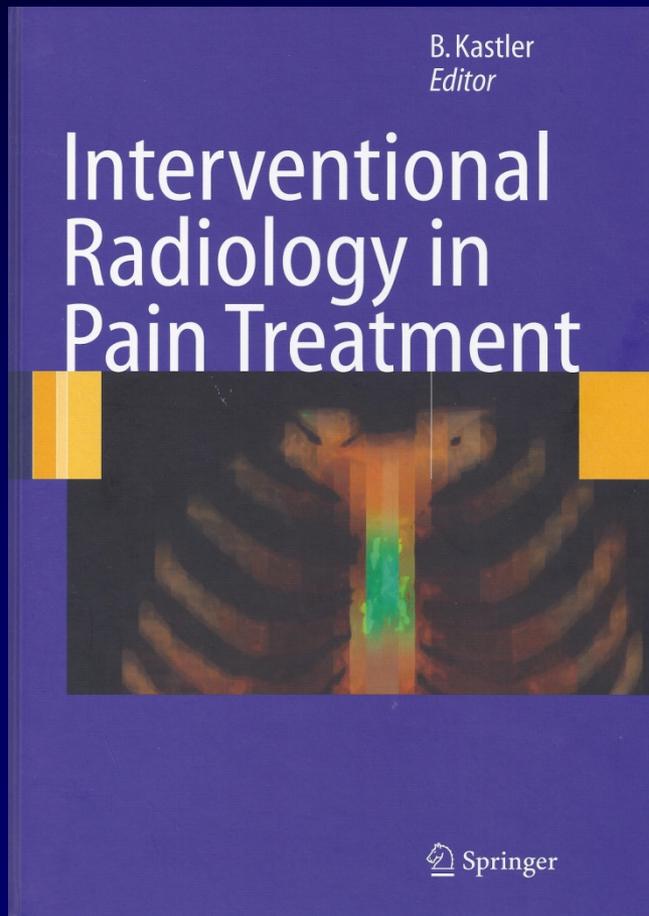
Abbreviations: VAS: Visual Analogue Scale; ADL: activity of daily life, Tx: treatment; NA: not available;

13/17



Tumorschmerz

setzen wir interventionelle Verfahren zu selten ein?



Schmerztherapie

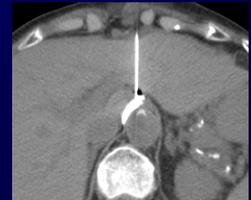
Invasive Verfahren

- Vertebroplastie
- Osteoplastie
- Infiltrationen / Blockaden
- Neurolysen

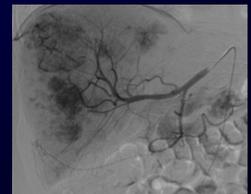
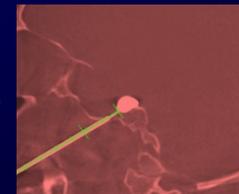


Kombinationseingriffe

- + systemische Therapie
- TACE



Ausblick

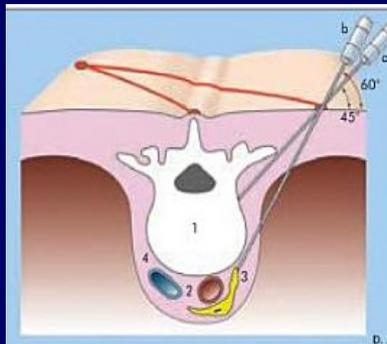
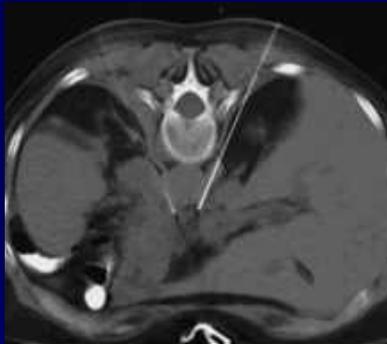
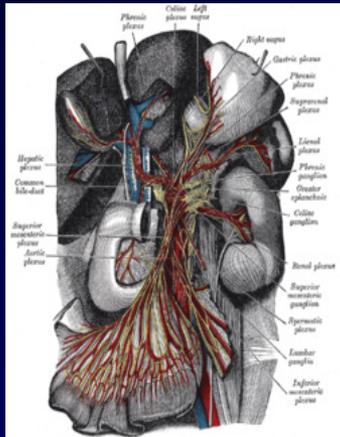




Tumorschmerz

setzen wir interventionelle Verfahren zu selten ein?

Periinterventionelle Schmerztherapie - Plexus coeliacus Blockade



Plexus coeliacus Blockade

Indikationen:

Therapieresistente gürtelförmige Oberbauchschmerzen. z.B. im Rahmen von malignen Tumoren (z.B. Pankreasarcarinom), Pankreatitis

Technik:

Bauchlage alternativ Rückenlage, sterile Abdeckung, 0.7 mm Nadel (22 Gauge), Lokalanästhesie

Punktion: Nadelspitze bei ventralem Zugang knapp cranial und ventral des Truncus coeliacus. Lagekontrolle mit 0.5 ml KM und 0.5 ml NaCl-Gemisch, bei guter bilateraler Verteilung Applikation des Medikamentengemisches

– Testdosis 1-2 ml Lidocain 5-10 Min
Bupivacain 0,25% 20-40 ml 1,5 mg/kg KG.
(Alkohol 95% - 100%)

Nebenwirkungen:

Hypotension, Diarrhoe, sehr selten Paraparese.

Blockade der viszerosensiblen Fasern aus den Baueingeweiden

Schmerztherapie –

setzen wir interventionelle Verfahren zu selten ein?



Die Medikamentöse Begleittherapie ist für die Akzeptanz der TACE entscheidend und trägt zum Behandlungserfolg bei

Die einzelnen Krankenhäuser/ Kliniken verwenden unterschiedliche Protokolle

Schmerz- und Postembolisationssyndrom-Management sind essentiell !

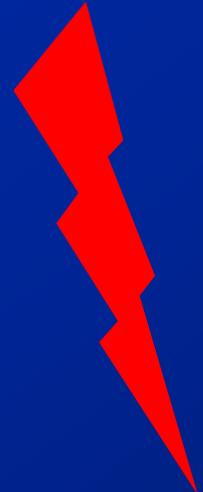
- standardmäßig -----> standardisiert -----> individuell adaptiert

Medikamentöse Begleittherapie bei TACE

Analgesie, Antiemese, Supportivtherapie

Die Wirkungen unterschiedlicher TACE – Protokolle erfordert adaptierte Behandlungsprotokolle

- Tumorausdehnung:	kompakt	----->	diffus
- Applikation:	selektiv	----->	bilobär
- Zytostatikum:	Doxorubicin	----->	Irinotecan
- Okklusion:	temporär	----->	dauerhaft
- TACE:	cTACE	----->	DEB- TACE



Substanzen mit hohem emetogenem Potential

Cisplatin



CMP



5-FU

Einhalten der Krankenhauspraxis – Nutzung der vorhandenen Ressourcen

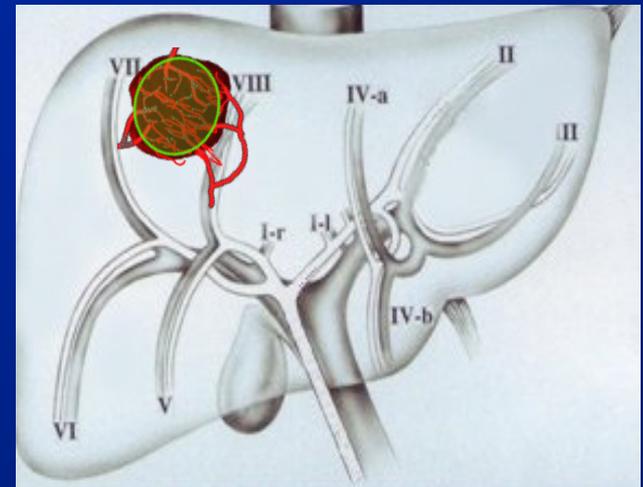
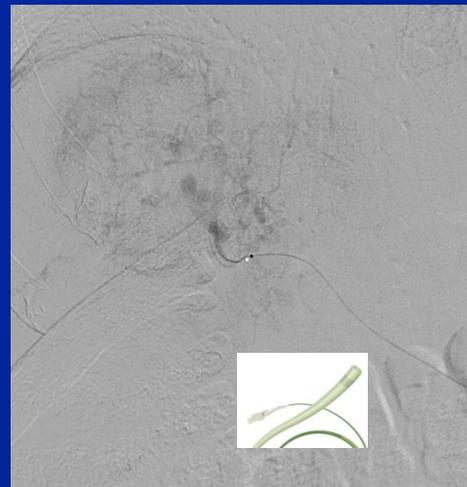
- Begleittherapie



Radiologe / Onkologe / Anästhesie

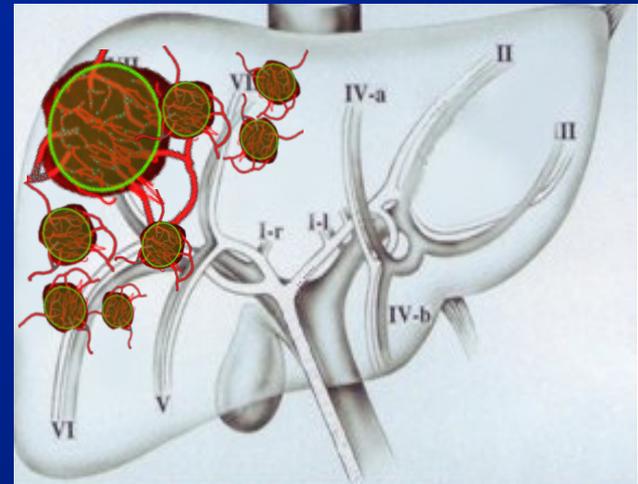
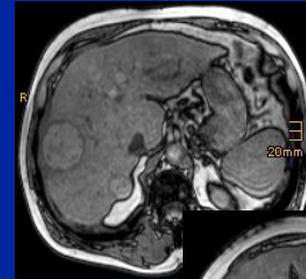
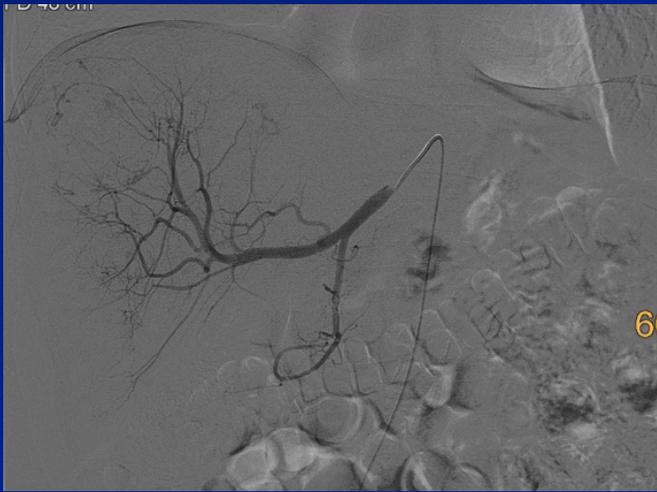
Medikamentöse Begleittherapie bei TACE

Herdverteilung: kompakt \longrightarrow selektive Therapie



Medikamentöse Begleittherapie bei TACE

Herdverteilung: diffuse → lobäre Therapie



Schmerztherapie –

setzen wir interventionelle Verfahren zu selten ein?



Schmerz- und PES-Management

Stufenschema zur Schmerztherapie:

- Vorgehen in drei Stufen (medikamentös)
- bei Versagen medikamentöser Maßnahmen invasive Maßnahmen erfolgen (Stufe 4).

Stufe 1	Nicht-opioides Analgetikum, ggf. in Kombination mit Adjuvanien	NSAID, Metamizol, Paracetamol
Stufe 2	Schwaches Opioid, ggf. in Kombination mit nicht-opioiden Analgetika und/oder Adjuvanien	Dolantin, Tramadol, Tilidin (+ Stufe I)
Stufe 3	Starkes Opioid, ggf. in Kombination mit nicht-opioiden Analgetika und/oder Adjuvanien	Morphin, Hydromorphon, Fentanyl, Tapentadol, Methadon (+ Stufe I)
Stufe 4	Invasive Techniken	Peridurale Injektion, Spinale Injektion, periphere Lokalanästhesie, Ganglienblockade

Schmerztherapie –

setzen wir interventionelle Verfahren zu selten ein?



Postembolization syndrom (liver)	DSM-TACE Stärke / EmboCept® S Lipiodol (n=263) (Dolantin i.v.)	starch microspheres (n=98) (Dolantin i.a.)
Total	41,8%	9,2%
pain	60 (22,8%)	3 (1,6%)
nausea	40 (15,2%)	6 (3,1%)
vomiting	26 (9,9%)	4 (4,1%)
fever	33 (12,6%)	2 (2,0%)
chill	11 (4,2%)	1 (1,0%)

University Bonn (dept of Radiology)

Pethidin® Dolantin
0,1 fache analgetische
Potenz von Morphin
v.a. hepatische Elimination
Dos. 50-100 mg langsam i.v.

Zusätzliche i.a. Schmerzprophylaxe

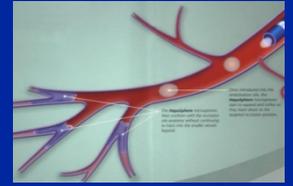
- Lidocain (Xyocain®2%), 1-1,5mg/kg KG, 25mg/Min, langsam i.a.
direkt vor TACE (z.B.. kapselnahe Herde)

Medikamentöse Begleittherapie bei TACE

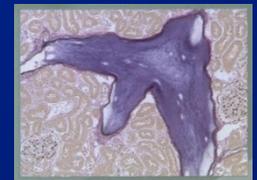
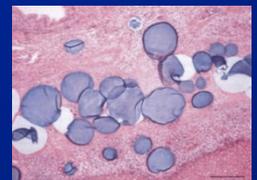
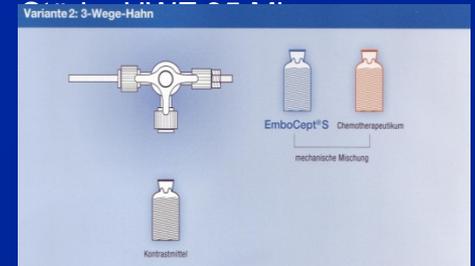
Embolisat: temporär
Protokoll: cTACE



permanent
DeBIRI



EmboCept S - Anilomer Abbaubare

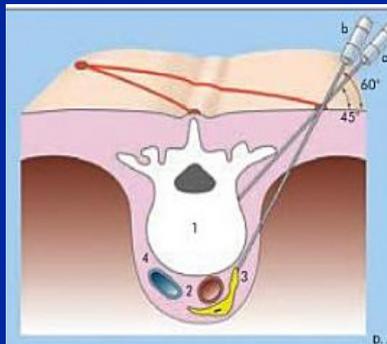
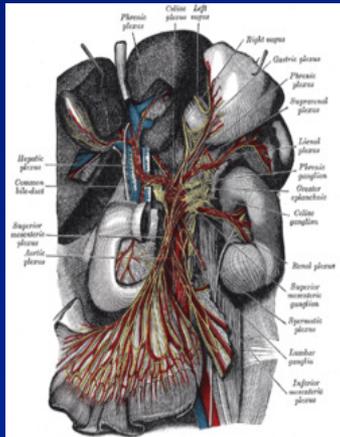


DC-BEADS™
beladbare Mikrosphären

Medikamentöse Begleittherapie bei TACE

Analgesie, Antiemese, Supportivtherapie – Optionen – Stufe IV

Periinterventionelle Schmerztherapie - Plexus coeliacus Blockade



Plexus coeliacus Blockade

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Nebenwirkungen:

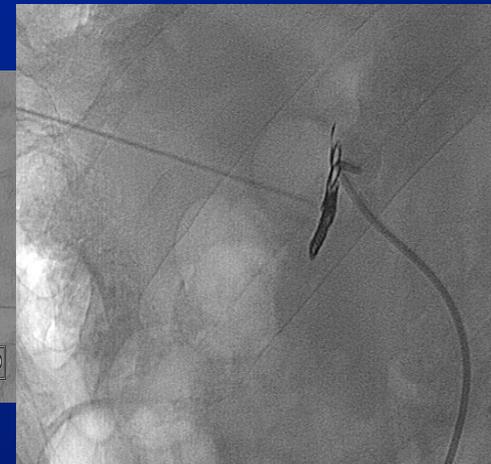
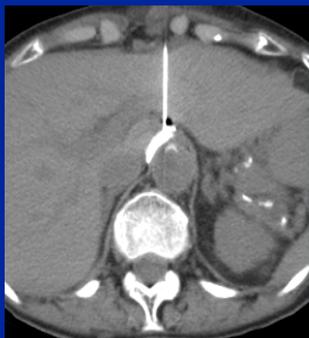
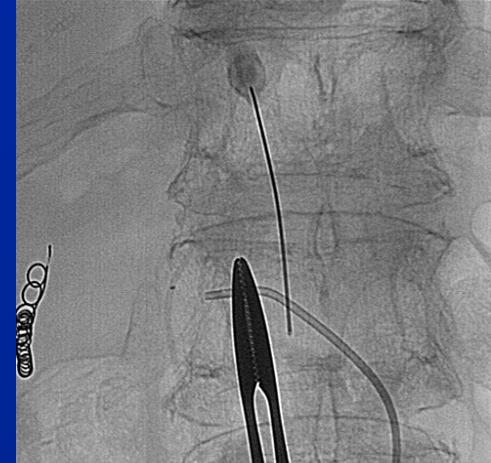
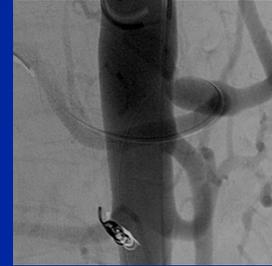
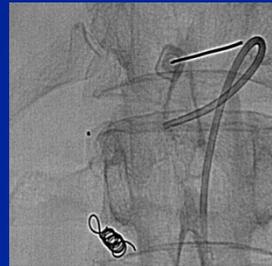
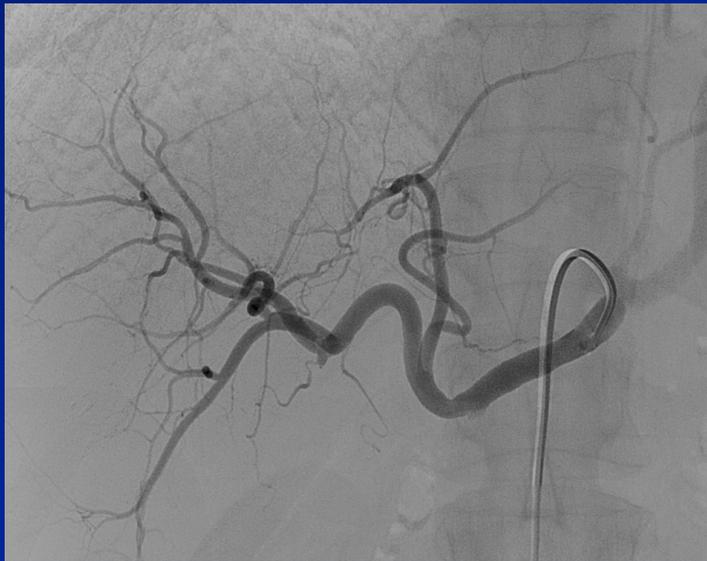
Hypotension, Diarrhoe, sehr selten Paraparese.

Blockade der viszerosensiblen Fasern aus den Baueingeweiden

Medikamentöse Begleittherapie bei TACE

Analgesie, Antiemese, Supportivtherapie - Optionen

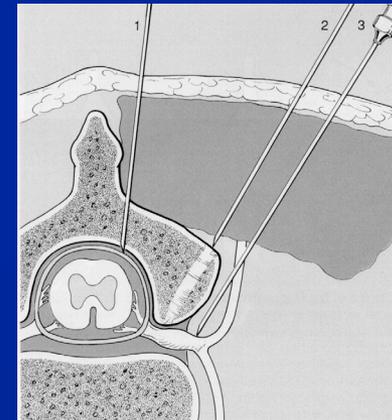
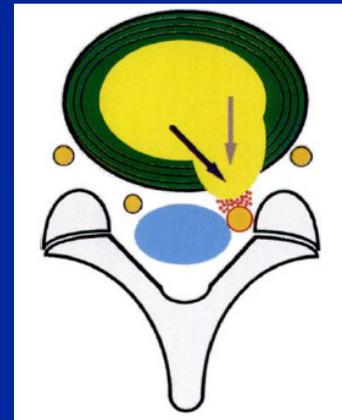
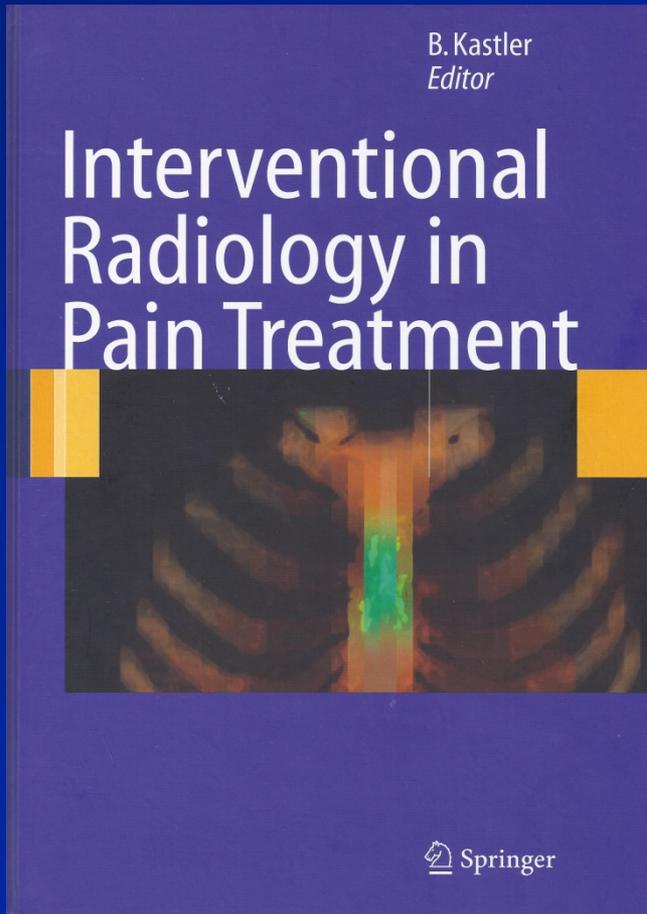
Periinterventionelle Schmerztherapie - Plexus coeliacus Blockade



Schmerztherapie –

setzen wir interventionelle Verfahren zu selten ein?

ja

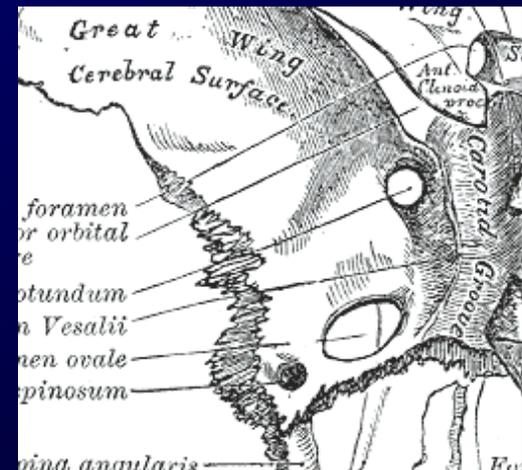
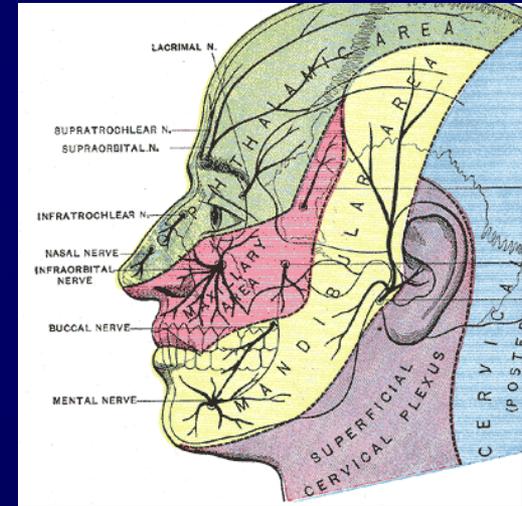
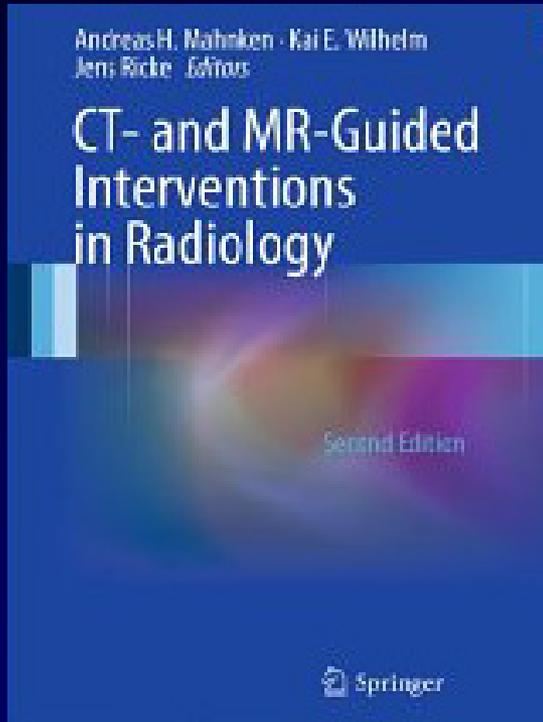


zusätzliche apparative Verfahren

- HiFU – perkutan
- Navigationssysteme

Schmerztherapie –

setzen wir interventionelle Verfahren zu selten ein?

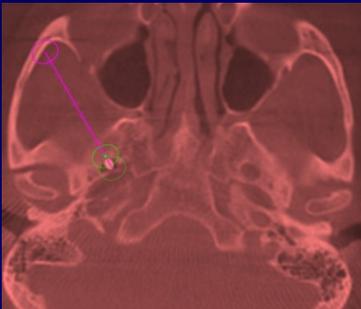
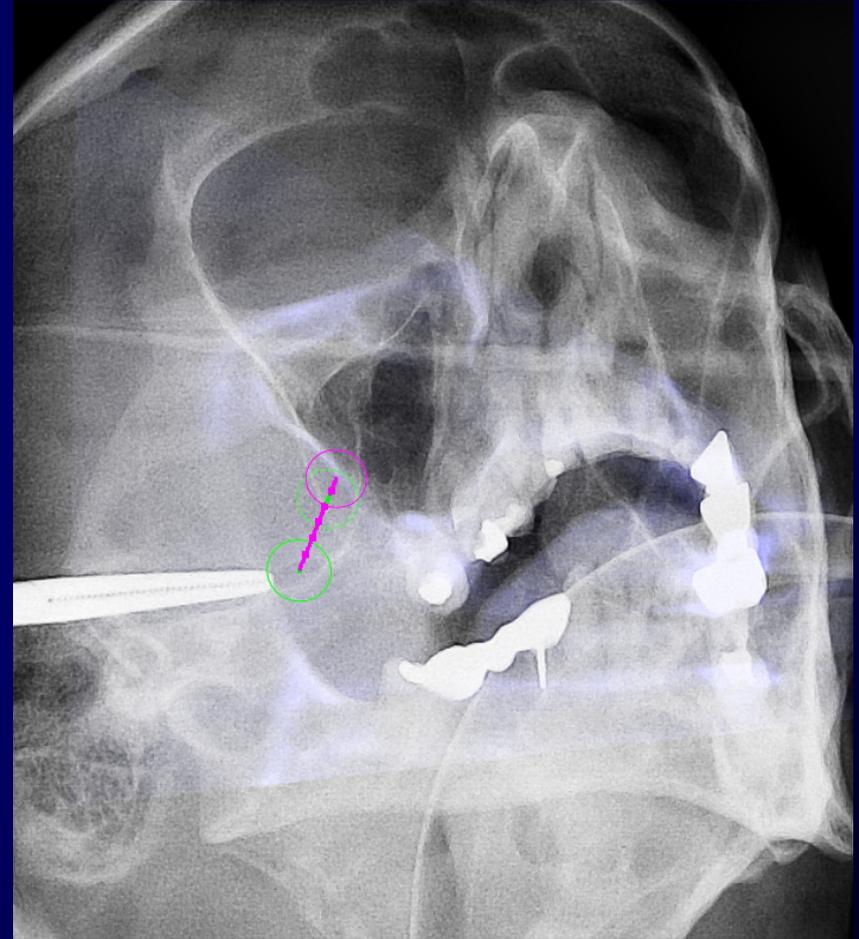
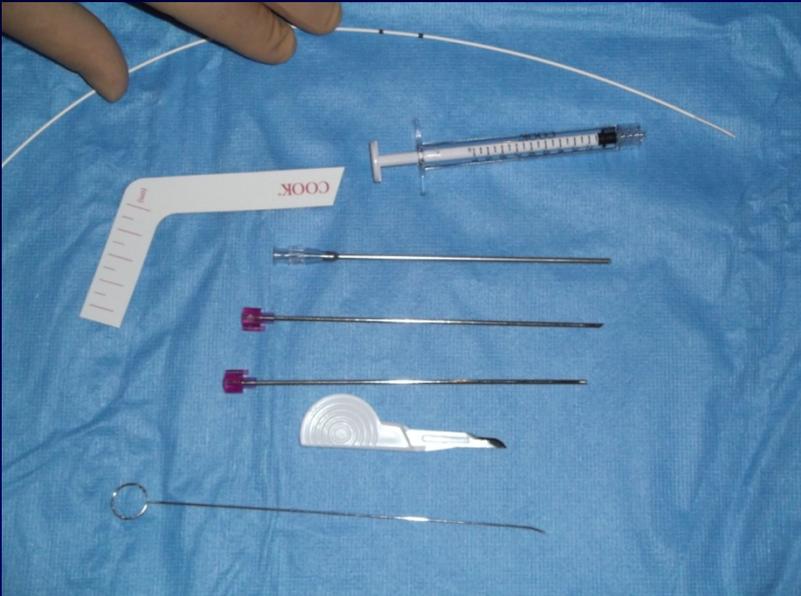


Trigeminusneuralgie

Mikrokompression des Ganglion trigeminale

Trigeminusneuralgie

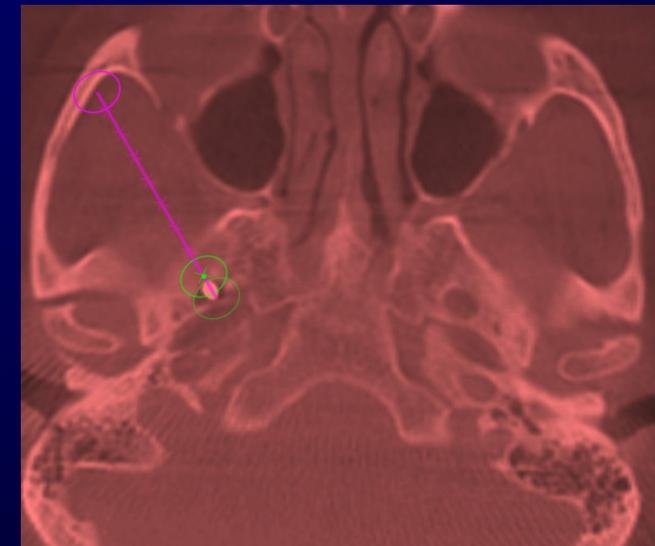
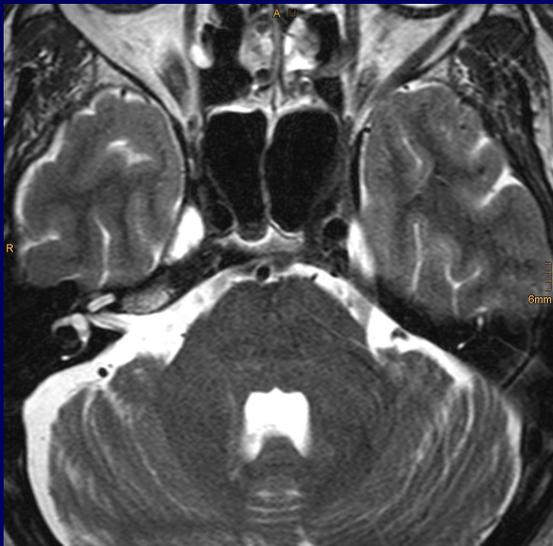
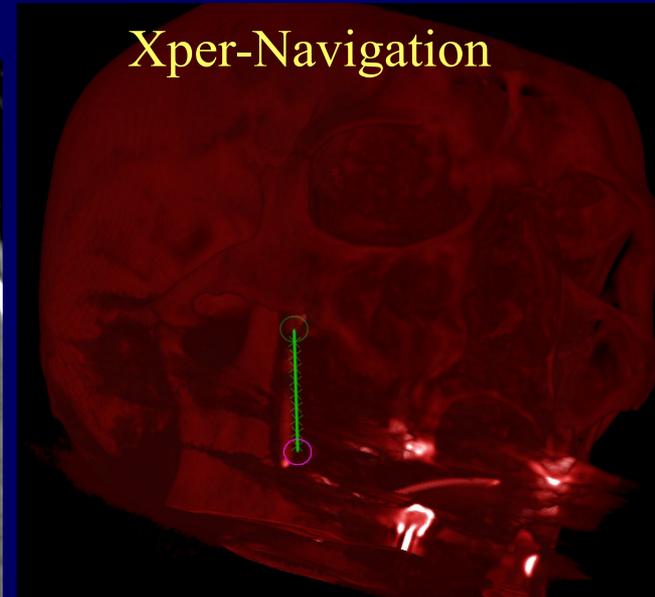
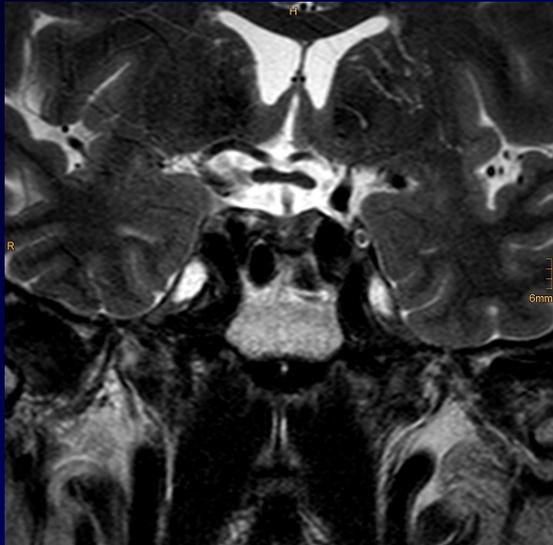
Mikrokompression des Ganglion trigeminale



Xper Guide
Navigation

Trigeminusneuralgie

Mikrokompression des Ganglion trigeminale



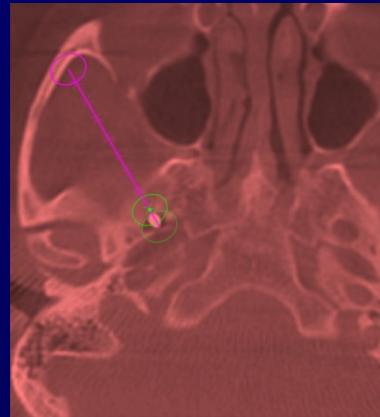
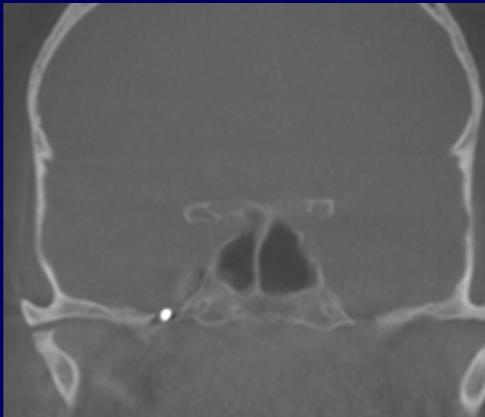
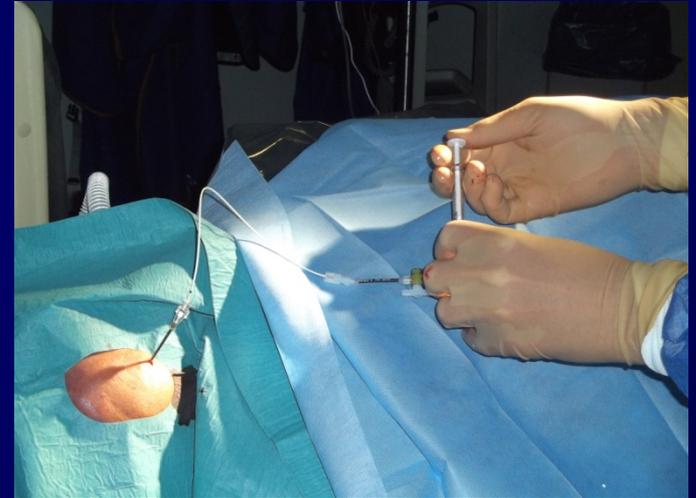
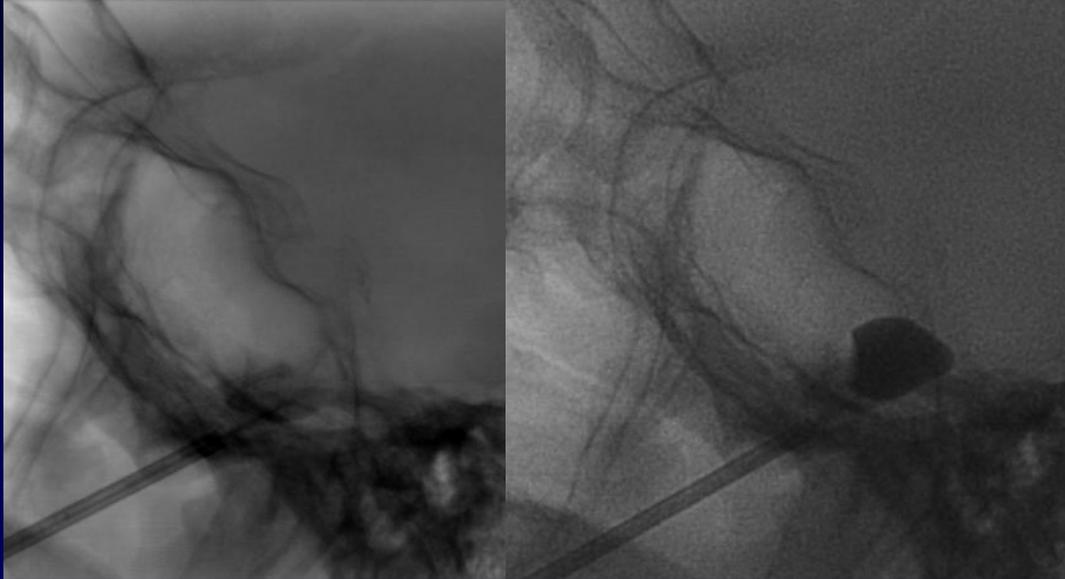
Trigeminusneuralgie

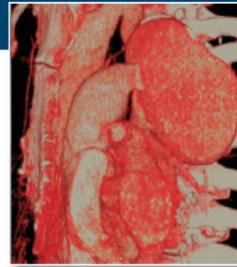
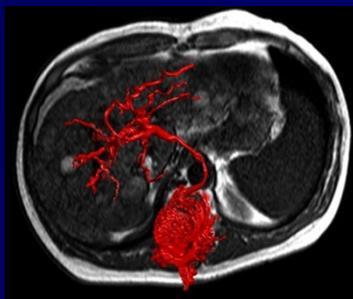
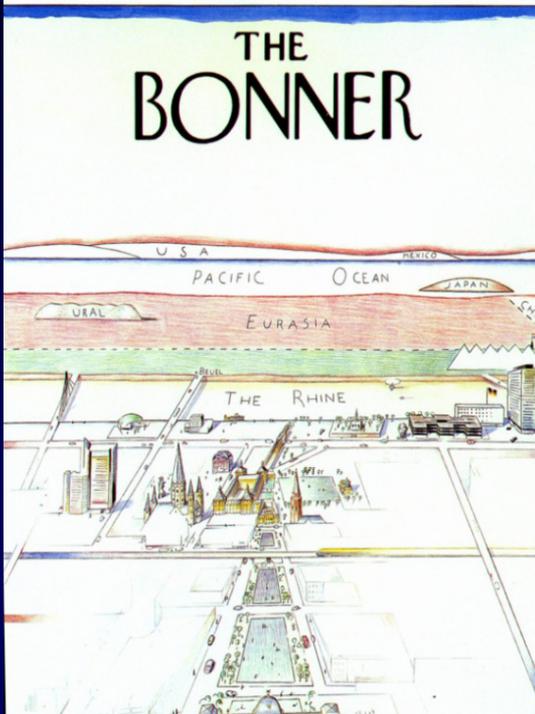
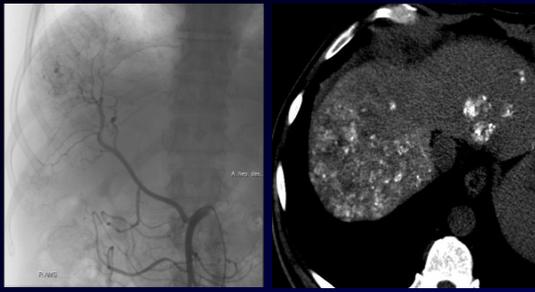
Mikrokompression des Ganglion trigeminale



Trigeminusneuralgie

Mikrokompression des Ganglion trigeminale





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