

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

SBRT ESPINAL

DRA. LINA MARIA LOAIZA
ONCOLOGA RADIOTERAPICA
UNIDAD FUNCIONAL CANCER ADULTOS
CLINICA SOMER
PRESIDENTE ASOCIACION COLOMBIANA DE
RADIOTERAPIA ONCOLOGICA- ACRO-



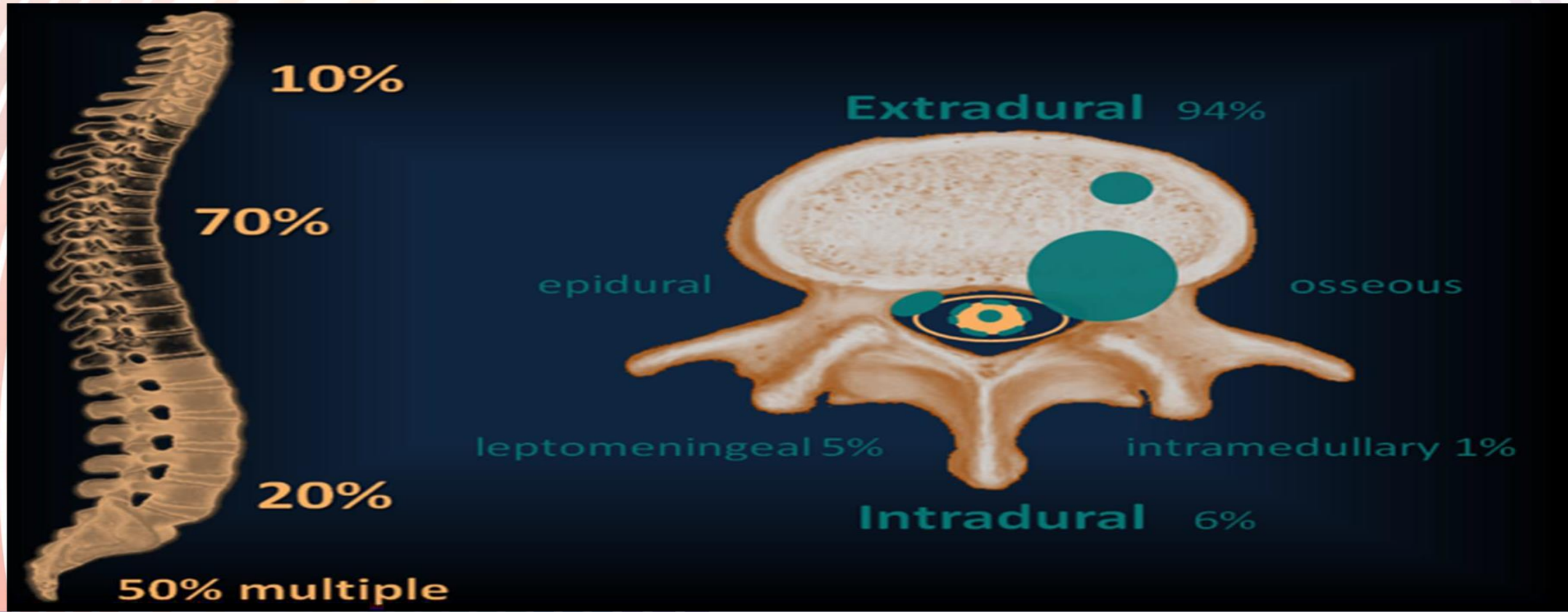
1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

- **80%** de los pacientes con cáncer avanzado pueden desarrollar un metástasis óseas
- **Cáncer de pulmón, próstata, mama.**
- Supervivencia asociada aumenta incidencia de metástasis óseas



1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

Hasta un 40% de las metástasis óseas son vertebrales



1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

IMPACTO EN LA CALIDAD DE VIDA (QoL)

- *Dolor*
- *Fracturas*
- *Inestabilidad vertebral*
- *Compresión medular*
- *Compromiso neurológico*
- *Alteración en los esfínter*



1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

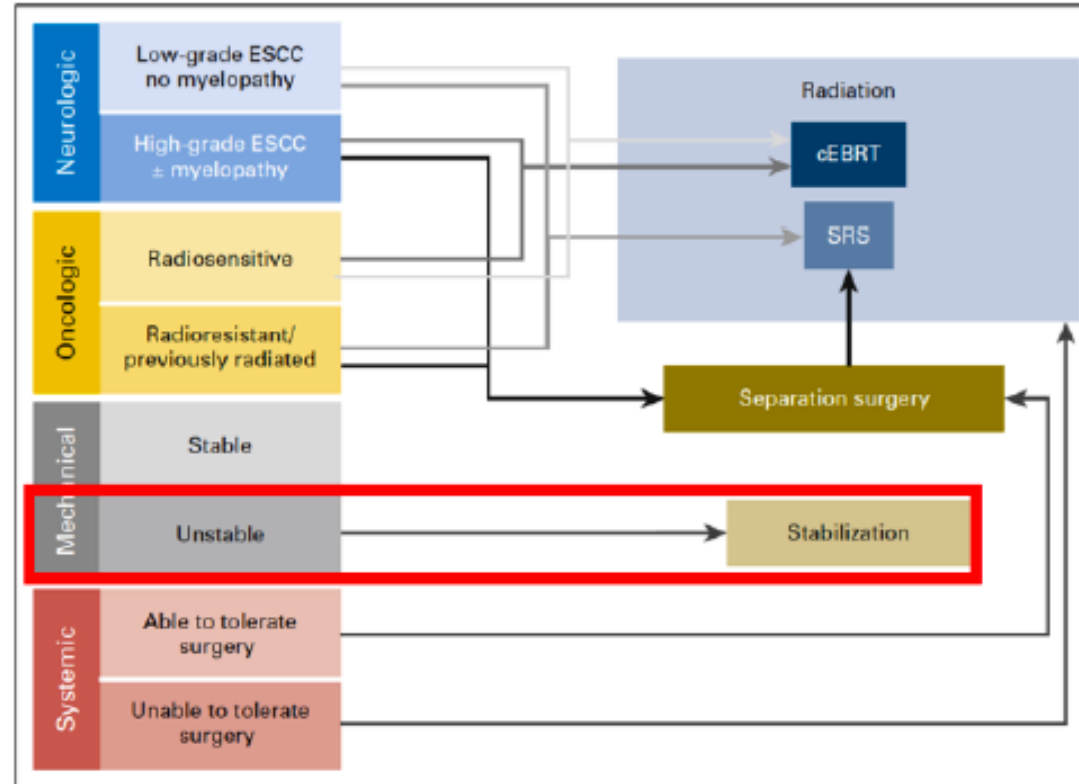
La Escala Visual Analógica (EVA)- VAS permite medir la intensidad del dolor que describe el paciente con la máxima reproducibilidad entre los observadores.



1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

NOMS Decision Framework

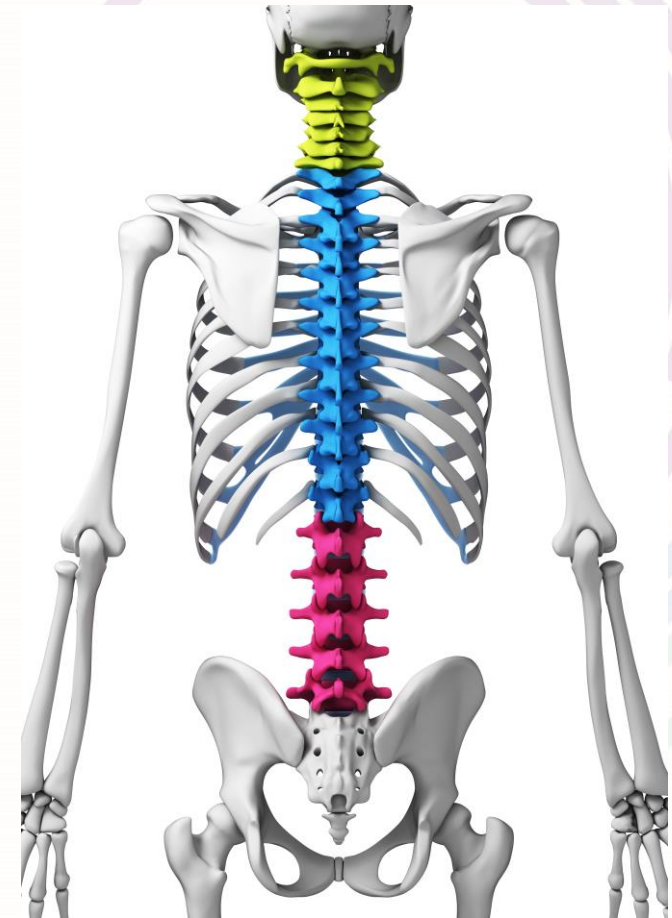
- **N**eurologic
- **O**ncologic
- **M**echanical
- **S**ystemic



Barzilai, Bilsky JCO 35, 2017. Laufer Oncologist 18, 2013

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

La evaluación con una resonancia magnética de columna completa, el inicio de esteroides sistémicos y la consideración la descompresión quirúrgica y/o radioterapia son los sellos distintivos de la estrategia de tratamiento



1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

La **escala SINS** puntúa la estabilidad vertebral de la columna en pacientes con afectación metastásica.

Table 1. Spinal Instability Neoplastic Score (SINS) System.^a

| Component | Score |
|---|-------|
| Location | |
| Junctional (O-C2; C7-T2; T11-L1; L5-S1) | 3 |
| Mobile spine (C3-6; L2-4) | 2 |
| Semirigid (T3-10) | 1 |
| Rigid (S2-S5) | 0 |
| Mechanical pain | |
| Yes | 3 |
| No | 2 |
| Pain free lesion | 1 |
| Bone lesion | |
| Lytic | 2 |
| Mixed (lytic/blastic) | 1 |
| Blastic | 0 |
| Radiographic spinal alignment | |
| Subluxation/translation present | 4 |
| Deformity (kyphosis/scoliosis) | 2 |
| Normal | 0 |
| Vertebral body collapse | |
| >50% collapse | 3 |
| <50% collapse | 2 |
| No collapse with >50% body involved | 1 |
| None of the above | 0 |
| Posterolateral involvement | |
| Bilateral | 3 |
| Unilateral | 1 |
| None of the above | 0 |

^aData adapted from Fischer et al.⁹

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

SENSIBILIDAD DEL 95%
ESPECIFICIDAD DEL 80%

Table 2. Total Spinal Instability Neoplastic Score: Determination of Stability.^a

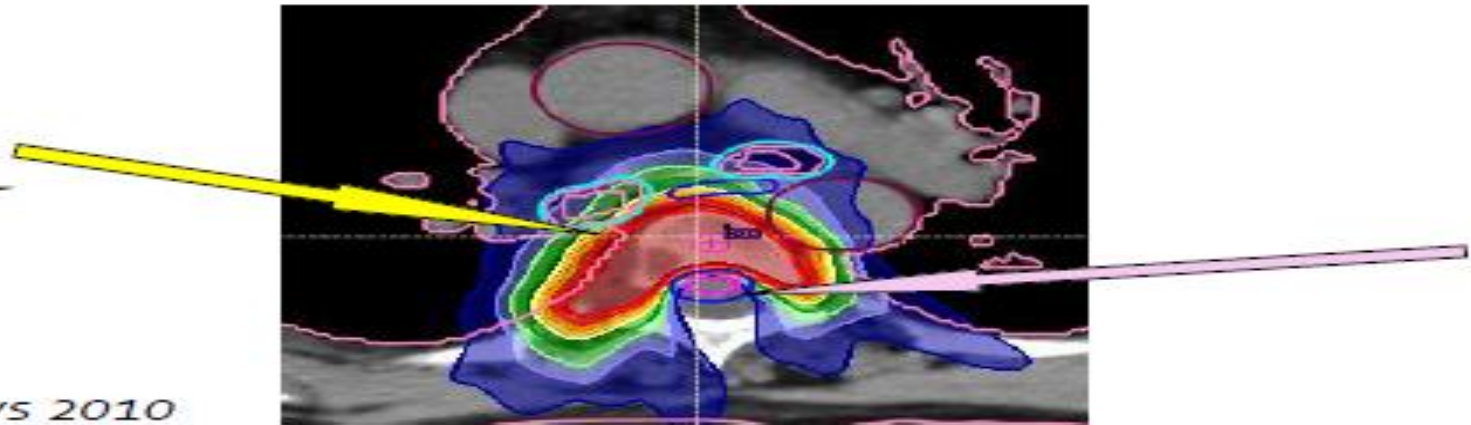
| | Score (Total = 0-18) | | |
|---------------------|----------------------|--|----------|
| | 1-6 | 7-12 | 13-18 |
| Clinical categories | Stable | Potentially unstable | Unstable |
| Binary scale | Stable | Current or potentially unstable = possible surgical intervention | |

^aData adapted from Fischer et al.⁹

Radioterapia estereotáxica extracraneal (SBRT)

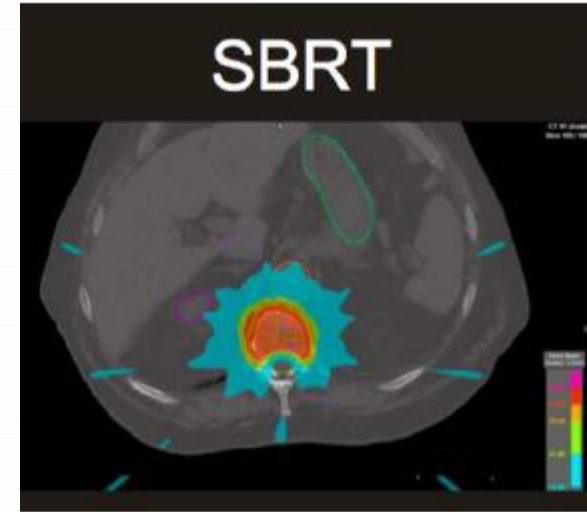
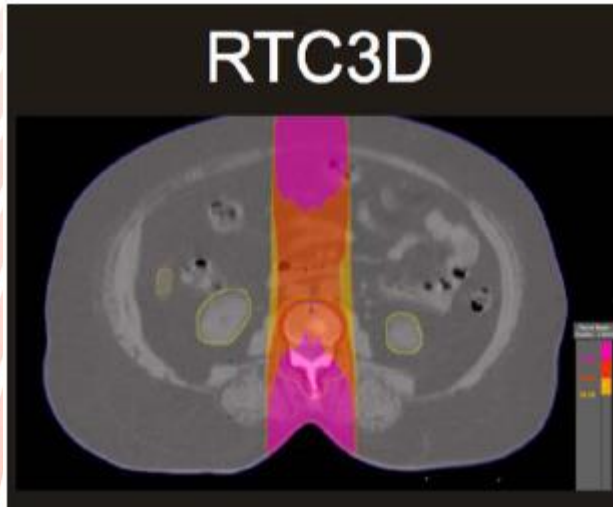
- ✓ Técnica **ALTA PRECISIÓN** "Precisión Estereotáxica"
- ✓ Dosis **ABLATIVAS** (alta eficacia biológica) **BED > 100Gy**
- ✓ En **POCAS SESIONES** (1-5)
- ✓ Dosis **MUY CONFORMADAS** (dosis bajas a tejidos sanos)

Alta
eficacia



Potters. Int J Radiat Oncol Biol Phys 2010

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía



La radioterapia convencional es más apropiada para pacientes que reciben tratamiento paliativo, con una expectativa de vida limitada de menos de 3 a 6 meses.

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

Clinical Review & Education

JAMA Oncology | Review

Stereotactic Ablative Radiotherapy for the Management of Spinal Metastases A Review

Rachel M. Glicksman, MD; Michael C. Tjong, MD; Wellington F. P. Neves-Junior, BSc; Daniel E. Spratt, MD; Kevin L. M. Chua, MD; Alireza Mansouri, MD; Melvin L. K. Chua, MD, PhD; Alejandro Berlin, MD; Jeff D. Winter, PhD; Max Dahele, MBChB; Ben J. Slotman, MD; Mark Bilsky, MD; David B. Shultz, MD; Marcos Maldaun, MD; Nicholas Szerlip, MD; Simon S. Lo, MD; Yoshiya Yamada, MD; Francisco Emilio Vera-Badillo, MD; Gustavo N. Marta, MD; Fabio Y. Moraes, MD

- **OBJETIVO:** Revisar la literatura de SABR espinal para metástasis espinales, discutir un enfoque multidisciplinario para la selección adecuada de pacientes y consideraciones técnicas, y resumir los esfuerzos actuales para combinar SABR espinal con terapias sistémicas.

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

Box. Team Members, Relevant Frameworks, and Patient and Oncologic Factors Contributing to Management of Spinal Metastases

Team Members

- Neuroradiologists
- Neurosurgeons
- Orthopedic surgeons
- Radiation oncologists
- Medical oncologists
- Palliative care specialists
- Pathologists

Relevant Frameworks

- Neurologic, oncologic, mechanical instability, systemic disease (NOMS)
- Location of spinal disease, mechanical instability, neurology, oncology, and patient fitness, prognosis, and prior therapy response (LMNOP)
- International Spine Oncology Consortium integrated multidisciplinary spinal metastases algorithms
- Metastatic Spine Disease Multidisciplinary Working Group Algorithm
- Spine Instability Neoplastic Score (SINS)
- Bilsky score
- Prognostic Index for Spine Metastases (PRISM)

Factors

Patient

- Age
- Performance status
- Goals of care
- Neurological symptoms and functional status

Oncologic

- Primary tumor histology (and radiosensitivity)
- Spine stability
- Presence and degree of epidural disease
- Extent of vertebral involvement
- Prior therapy at site of spinal metastases
- Overall disease burden
- Pace of disease progression
- Systemic treatment options

El manejo óptimo de los pacientes con metástasis espinales requiere un equipo multidisciplinario integrado y tiene en cuenta los factores oncológicos y del paciente

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

Clinical Investigation: Central Nervous System Tumor

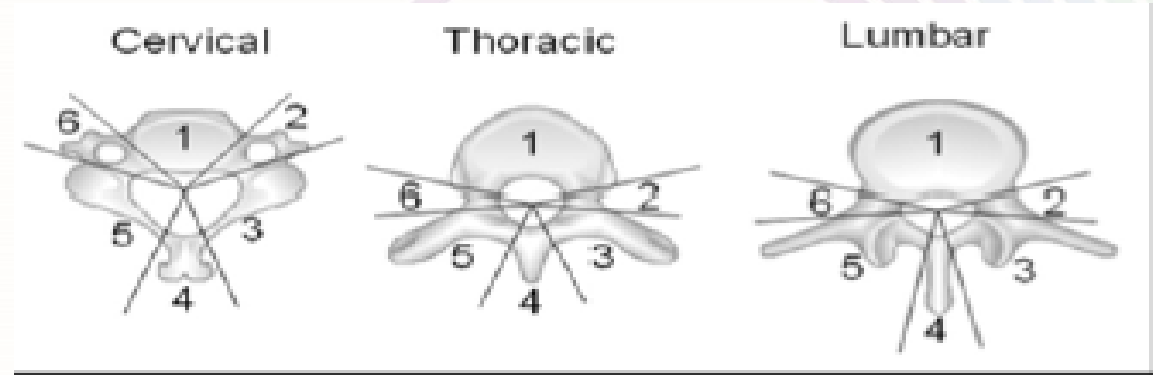
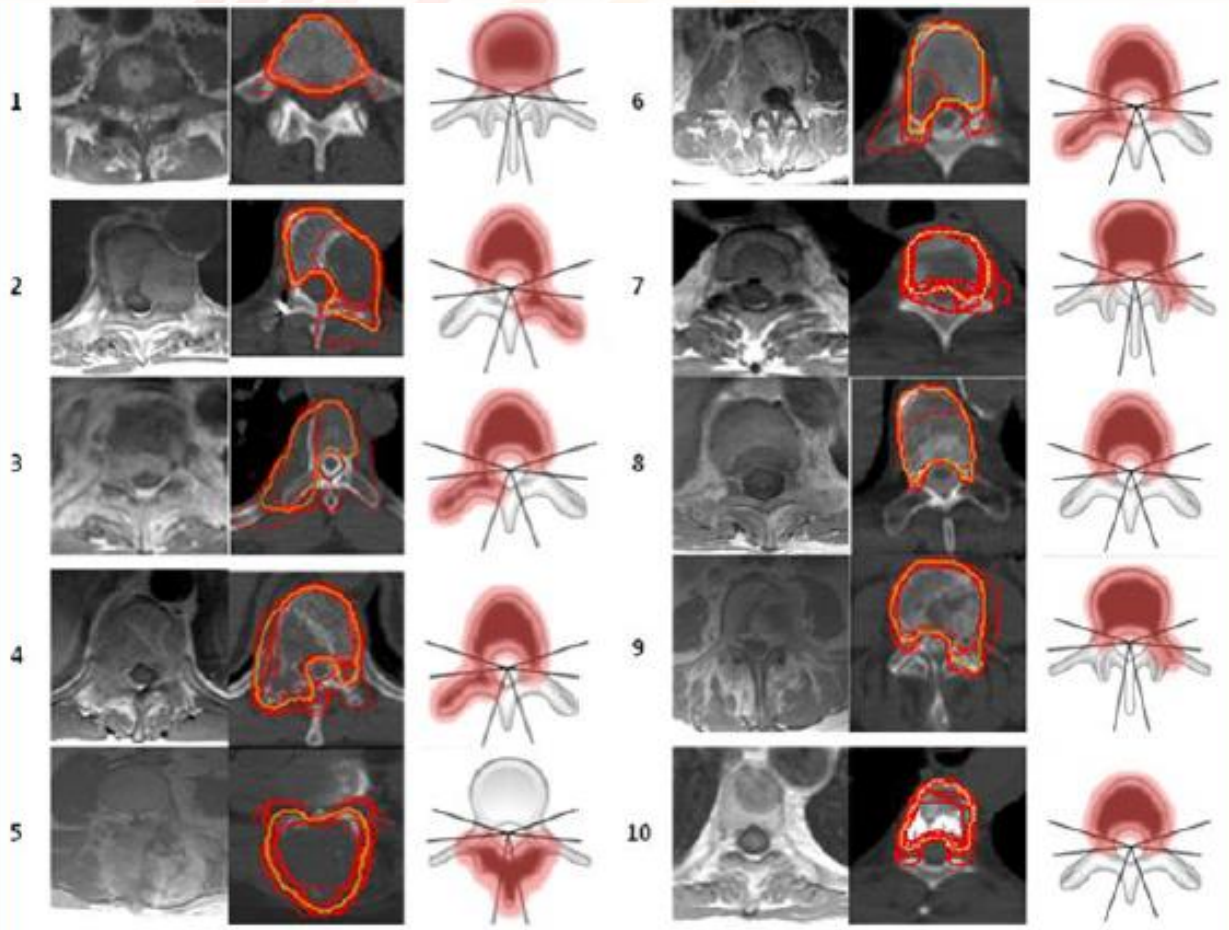
International Spine Radiosurgery Consortium Consensus Guidelines for Target Volume Definition in Spinal Stereotactic Radiosurgery

Brett W. Cox, MD,^{*,1} Daniel E. Spratt, MD,^{*,1} Michael Lovelock, PhD,[†]
Mark H. Bilsky, MD,[‡] Eric Lis, MD,[§] Samuel Ryu, MD,^{||} Jason Sheehan, MD,[¶]
Peter C. Gerszten, MD, MPH,^{**} Eric Chang, MD,^{††} Iris Gibbs, MD,^{‡‡} Scott Soltys, MD,^{‡‡}
Arjun Sahgal, MD,^{§§} Joe Deasy, PhD,[†] John Flickinger, MD,^{|||} Mubina Quader, PhD,^{|||}
Stefan Mindea, MD,^{¶¶} and Yoshiya Yamada, MD^{‡‡}

International Journal of
Radiation Oncology
biology • physics

www.redjournal.org

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía



Se divide cada cuerpo vertebral en 6 sectores:

- 1 representa el cuerpo vertebral
- 2 representa el pedículo izquierdo
- 3 representa el proceso transversal izquierdo y la lámina
- 4 representa el proceso espinoso
- 5 representa el proceso transversal derecho y la lámina
- 6 representa el pedículo derecho.

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

Volume 83 • Number 5 • 2012

Target volume guidelines for spinal SRS e603

Table 3 Guidelines for spinal SRS bony CTV delineation

| GTV involvement | ISRC GTV anatomic classification | ISRC bony CTV recommendation | CTV description |
|---|----------------------------------|------------------------------|--|
| Any portion of the vertebral body | 1 | 1 | Include the entire vertebral body |
| Lateralized within the vertebral body | 1 | 1, 2 | Include the entire vertebral body and the ipsilateral pedicle/transverse process |
| Diffusely involves the vertebral body | 1 | 1, 2, 6 | Include the entire vertebral body and the bilateral pedicles/transverse processes |
| GTV involves vertebral body and unilateral pedicle | 1, 2 | 1, 2, 3 | Include entire vertebral body, pedicle, ipsilateral transverse process, and ipsilateral lamina |
| GTV involves vertebral body and bilateral pedicles/transverse processes | 3 | 2, 3, 4 | Include entire vertebral body, bilateral pedicles/transverse processes, and bilateral laminae |
| GTV involves unilateral pedicle | 2 | 2, 3 ± 1 | Include pedicle, ipsilateral transverse process, and ipsilateral lamina, ± vertebral body |
| GTV involves unilateral lamina | 3 | 2, 3, 4 | Include lamina, ipsilateral pedicle/transverse process, and spinous process |
| GTV involves spinous process | 4 | 3, 4, 5 | Include entire spinous process and bilateral laminae |

Abbreviations: CTV = clinical target volume; GTV = gross tumor volume; ISRC = International Spine Radiosurgery Consortium.

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

e604 Cox et al.

International Journal of Radiation Oncology • Biology • Physics

Table 4 Summary of contouring guidelines for GTV, CTV, and PTV in spinal stereotactic radiosurgery

| Target volume | Guidelines |
|---------------|---|
| GTV | <ul style="list-style-type: none"> • Contour gross tumor using all available imaging • Include epidural and paraspinal components of tumor |
| CTV | <ul style="list-style-type: none"> • Include abnormal marrow signal suspicious for microscopic invasion • Include bony CTV expansion to account for subclinical spread • Should contain GTV • Circumferential CTVs encircling the cord should be avoided except in rare instances where the vertebral body, bilateral pedicles/lamina, and spinous process are all involved or when there is extensive metastatic disease along the circumference of the epidural space without spinal cord compression |
| PTV | <ul style="list-style-type: none"> • Uniform expansion around CTV • CTV to PTV margin ≤ 3 mm • Modified at dural margin and adjacent critical structures to allow spacing at discretion of the treating physician unless GTV compromised • Never overlaps with cord • Should contain entire GTV and CTV |

Abbreviations: CTV = clinical target volume; GTV = gross tumor volume; PTV = planning target volume.

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía



ELSEVIER



Stereotactic Body Radiation Therapy for Spinal Metastases: Benefits and Limitations



Matthias Guckenberger, MD,* Max Dahele, MBChB, PhD,[†] Wee Loon Ong, MBBS,^{‡,§} and Arjun Sahgal, MD[‡]

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

Table 1 Workflow Process for Spine SBRT

Pre-treatment assessments

- Clinical examination including neurological function assessment
- Quantitative pain assessment using validated instruments such as the visual analogue scale (VAS) or brief pain inventory (BPI)
- Spinal instability assessment using the Spinal Instability Neoplastic Score (SINS)
- Epidural spinal cord compression assessment using the score developed by Bilsky et al.

SBRT planning

- High-resolution CT imaging
- High-resolution MR imaging: T1 without contrast; T1 with contrast in presence of paraspinal or epidural disease; T2 non-contrast
- Careful rigid image-registration
- Target volume definition following international consensus recommendations
- IMRT treatment planning
- VMAT and flattening-filter-free (FFF) technologies to minimize SBRT delivery times
- Daily pre-treatment image-guided patient set-up
- Passive or active intra-fraction motion control

Follow-up

- Clinical follow-up using pre-treatment assessments
 - Imaging follow-up using high-resolution CT and / or MR imaging
-

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

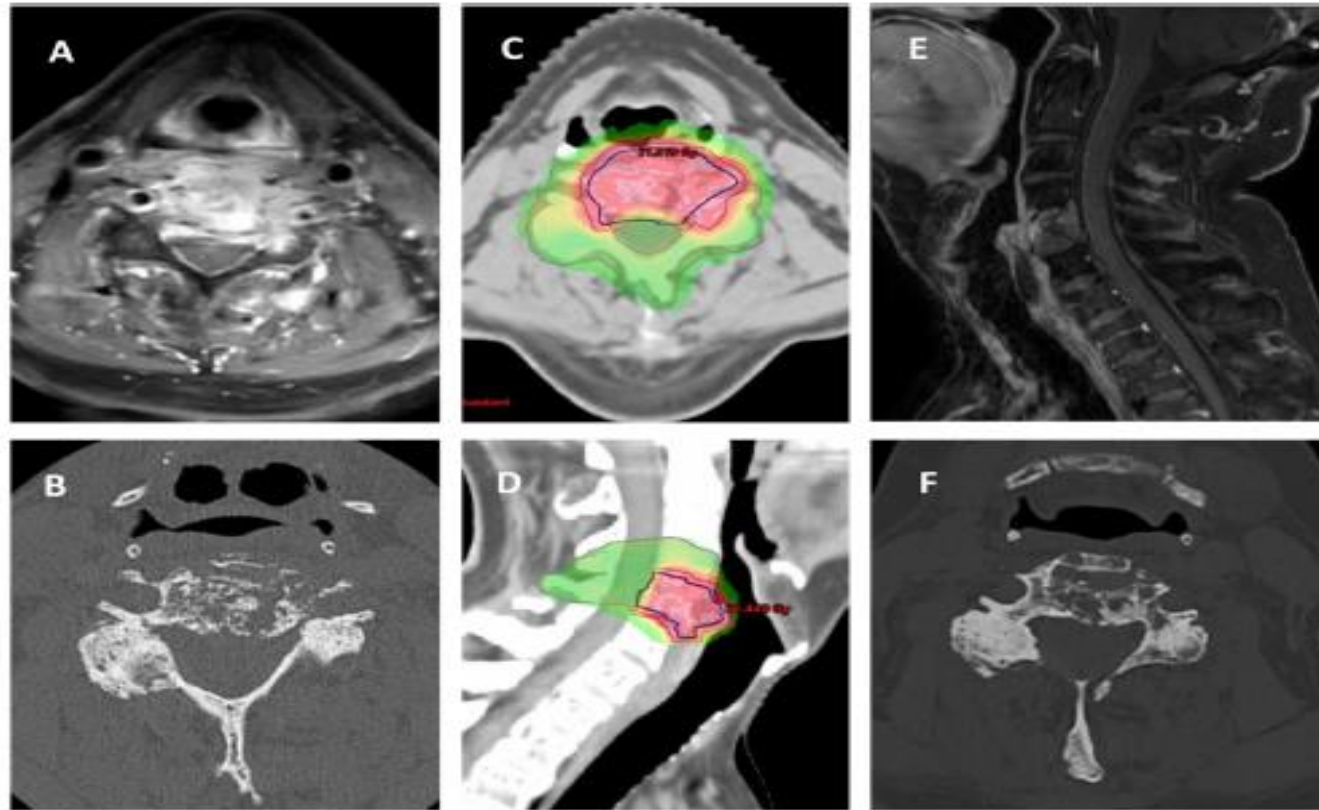


Figure 1 (A, B): Pre-treatment MRI and CT imaging of a 74 years old patient with metastatic prostate cancer; (C, D): VMAT-based SBRT planning using a simultaneous integrated boost concept with 30Gy in 10 fractions (low-dose target volume) and 48.5Gy in 10 fractions (high-dose target volume); (E, F): MRI and CT imaging follow-up showing local control w/o vertebral compression fracture;



1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

Table 2 Randomized Trials Comparing Conventional Radiotherapy and SBRT for Painful Spine metastases

| Study | # pts | Randomization | Endpoint | Complete Pain Response | Overall Pain Response | Pain Reduction |
|---|-------|---|-------------------------------------|------------------------|-----------------------|----------------|
| LBA 2 OCTG SC.24/TROG 17.06 ²⁰ | 229 | 24Gy in 2Fx vs 20Gy in 5Fx | Complete pain response @ 3 mo | 35% vs 14% * | 53% vs 39% | -3.00 vs -3.83 |
| NRG / RTOG 0631 ^{26,†} | 339 | 18Gy / 18Gy in 1Fx vs 8Gy in 1Fx | Pain response @ 3 mo (min 3 points) | | 40.3% vs 57.9% | |
| University of Heidelberg ²⁸ | 55 | 24Gy in 1Fx Vs 30Gy in 10Fx | Pain response @ 3 mo (min 2 points) | 43.5% vs 17.4% | 69.6% vs 47.8% | -22.4 vs -20.3 |
| University Medical Center Utrecht ^{29,‡} | 110 | 1 x 18 Gy, 3 x 10 Gy or 5 x 7 Gy vs 1 x 8 Gy, 5 x 4 Gy or 10 x 3 Gy | Pain response @ 3 mo (min 2 points) | | 40% vs 32% | -2.9 vs -2.5 |

* Statistically significant.

† Reported as abstract and not as full manuscript yet.

‡ Study used the trials within a cohort concept (TWiCa), allowed various fractionations, included non-spine bone metastases and is limited due to large number of drop-outs.

- La SBRT está asociada con tasas más altas de respuesta completa al dolor en comparación con la radioterapia Convencional
- Pacientes con una esperanza de vida más larga y los pacientes con las denominadas histologías "radiatorresistentes" deben evaluarse como candidatos para la SBRT.
- La evidencia más sólida está disponible para la administración de SBRT con 24 Gy en 2 fracciones.
- Para pacientes con esperanza de vida corta (<3-6 meses) e histologías radiosensibles, la radioterapia convencional de fracción única es un tratamiento estándar eficaz.

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

LIMITACIONES- TOXICIDAD

Table 3 Summary of Selected Series Reporting VCF Following SBRT

| Study | Number Patients (Spinal Segments Treated) | Median Follow-up (Y) | Dose and Fractionation (BED With $\alpha/\beta=3$) | New/Progressive VCF | Time to VCF (Median, Mo) | Number of Patients Requiring Percutaneous or Surgical Intervention |
|--|---|------------------------------------|---|--|--------------------------|---|
| Moussazadeh ⁵⁴ | 31 (36) | 6.1 | 1 × 24Gy (216Gy ₃) | 13 treated segments (36%) in 12 patients | 25.7 mo | 5 |
| Guckenberger ³⁹ | 57 (63) | 5 | 10 × 3/4.85Gy (127Gy ₃) in 56%; 5 × 4/7Gy (117Gy ₃) in 44% | 12 pts (21%) new; 8 pts (14%) progressive | 2 mo | 3 (1 stabilization surgery, 2 decompression) |
| Ning ⁵⁵ | 52 (69) | 6.7 | Varied from 3 × 8Gy (88Gy ₃) up to 1 × 24Gy (216Gy ₃) | 8 treated sites (14%) in 7 pts (13%) | 7.5 mo | 6 (percutaneous vertebroplasty or surgery) |
| Ling ¹³⁵ | 43 (54) | 6.8 | 1 × 12-24Gy (60Gy ₃ -216Gy ₃) | 9/54 sites (17%) | 10.2 mo | 5 (stabilization surgery) |
| Zeng ⁹³ | 66 (119) | 0.9 | 2 × 12Gy (120Gy ₃) | 8 iatrogenic VCF (8/119 segments=7%) | Not reported | 4 (3 surgery, 1 percutaneous cement) |
| Abbouchie ¹³⁶ | 84 (113) | 1.1/treated lesion; 1.0 imaging | Median: 3 × 10Gy (130Gy ₃) | 2 new (2/113=2%); 3 progressive (3/113=3%) | 9.2 mo | None |
| Lee ¹³⁷ Jawad ¹⁰⁰ | 85 (173) 541 | 1.2 0.8; 0.7 imaging | 1 × 16 or 18Gy (101/126Gy ₃) Median 1 × 20Gy (153Gy ₃) | 21/173 (12%) 18 new (3% pts), 16 progressive (3% pts) | 11.1 mo 3 mo | 4 Rate of surgery specifically for VCF not reported |
| Sahgal ⁹⁹ | 252 (410) | 1.0 | Varied from 1 × 8Gy (29Gy ₃) up to 1 × 26Gy (251Gy ₃) | 27/410 new (7%); 30/410 progressive (7%) | 2.5 mo | 24 (17 cement augmentation, 6 surgical stabilization, 1 percutaneous instrumentation) |

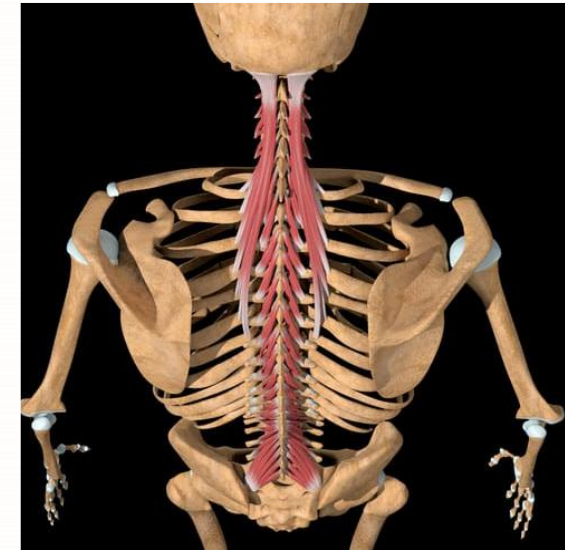
1. La fractura por compresión vertebral (FCV) ha surgido como la toxicidad más relevante asociada con la SBRT en dosis altas

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

2. Mielopatía: la incidencia de mielopatía por radiación fue del 0,4 % en un análisis combinado de más de 1000 pacientes, y el riesgo es ligeramente mayor, del 1,2 %, después de la re-irradiación con SBRT de la columna.

3. La plexopatía braquial y la plexopatía lumbosacra son toxicidades tardías

4. Miositis



1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

Clinical Oncology 34 (2022) 325–331



ELSEVIER

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Clinical Oncology

journal homepage: www.clinicaloncologyonline.net



The Changing Landscape for the Treatment of Painful Spinal Metastases: is Stereotactic Body Radiation Therapy the New Standard of Care?

E.M. Dunne*, M.C. Liu*, S.S. Lo†, A. Sahgal‡



Clinical Oncology , May 2022

SBRT podría considerarse estándar de tratamiento en pacientes seleccionados

Table 2
Comparison of pain response at 3 and 6 months post-treatment

| Median follow-up (months) | Sprave <i>et al.</i> [20] | | RTOG 0631 [22] | | SC24 [23] | |
|---------------------------|---------------------------|-----------|----------------|----------|-----------|----------|
| | 3 months | 6 months | 3 months | 6 months | 3 months | 6 months |
| CR pain cEBRT/SBRT | 17.4%/43.5% | 10%/52.6% | NR | NR | 14%/35% | 16%/32% |
| PR pain cEBRT/SBRT | 30.43%/26.1% | 25%/21.1% | NR | NR | 25%/18% | 16%/9% |
| CR or PR cEBRT/SBRT | | | 57.9%/40.3% | | | |
| | | | $P = 0.99$ | | | |

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía



ELSEVIER

Contents lists available at [ScienceDirect](#)

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com



Original Article

International consensus recommendations for target volume delineation specific to sacral metastases and spinal stereotactic body radiation therapy (SBRT)



Emma M. Dunne^{a,*}, Arjun Sahgal^b, Simon S. Lo^c, Alanah Bergman^a, Robert Kosztyla^a, Nicolas Dea^d, Eric L. Chang^e, Ung-Kyu Chang^f, Samuel T. Chao^g, Salman Faruqi^h, Amol J. Ghiaⁱ, Kristin J. Redmond^j, Scott G. Soltys^k, Mitchell C. Liu^a

Radiotherapy and Oncology 145 (2020) 21–29

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

EM. Dunne et al / Radiotherapy and Oncology 145 (2020) 21-29

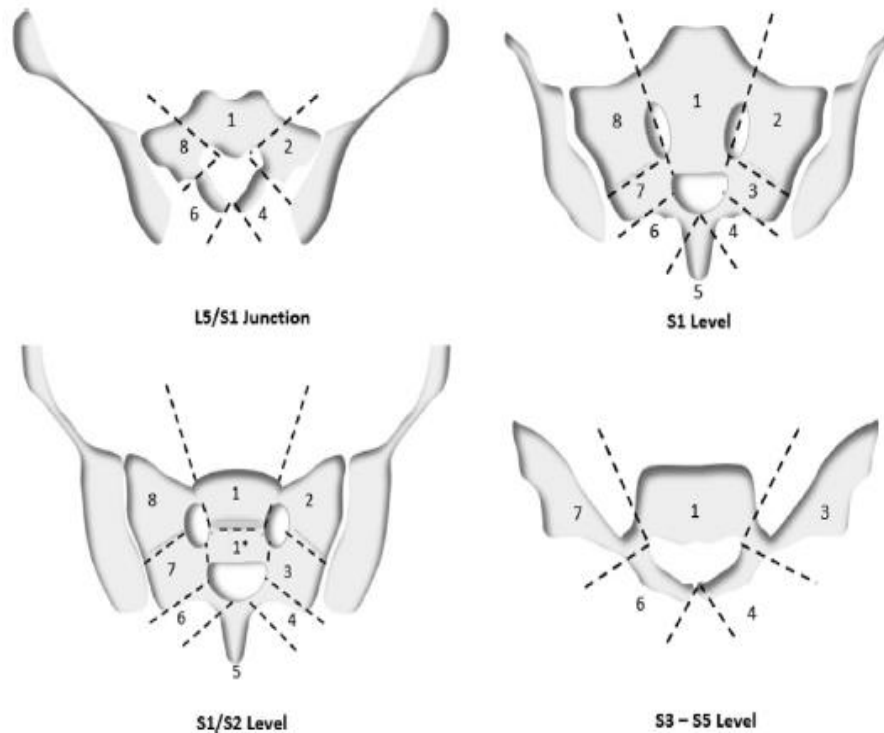


Fig. 1. Stereotactic Radiosurgery Sacral Classification System. 1. vertebral body [1* represents the subsequent caudal vertebral body (S2 in this illustration)]; 2. left anterior ala; 3. left posterior ala; 4. left lamina; 5. spinous process; 6. right lamina; 7. right posterior ala; 8. right anterior ala.

SCS (radiocirugía estereotáctica sacra)

Divide el sacro en ocho segmentos

- (1) cuerpo vertebral
- (2) ala anterior izquierda
- (3) ala posterior izquierda
- (4) lámina izquierda
- (5) apófisis espinosa
- (6) lámina derecha
- (7) ala posterior derecha
- (8) ala anterior derecha

1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

E.M. Dunne et al. / Radiotherapy and Oncology 145 (2020) 21–29

27

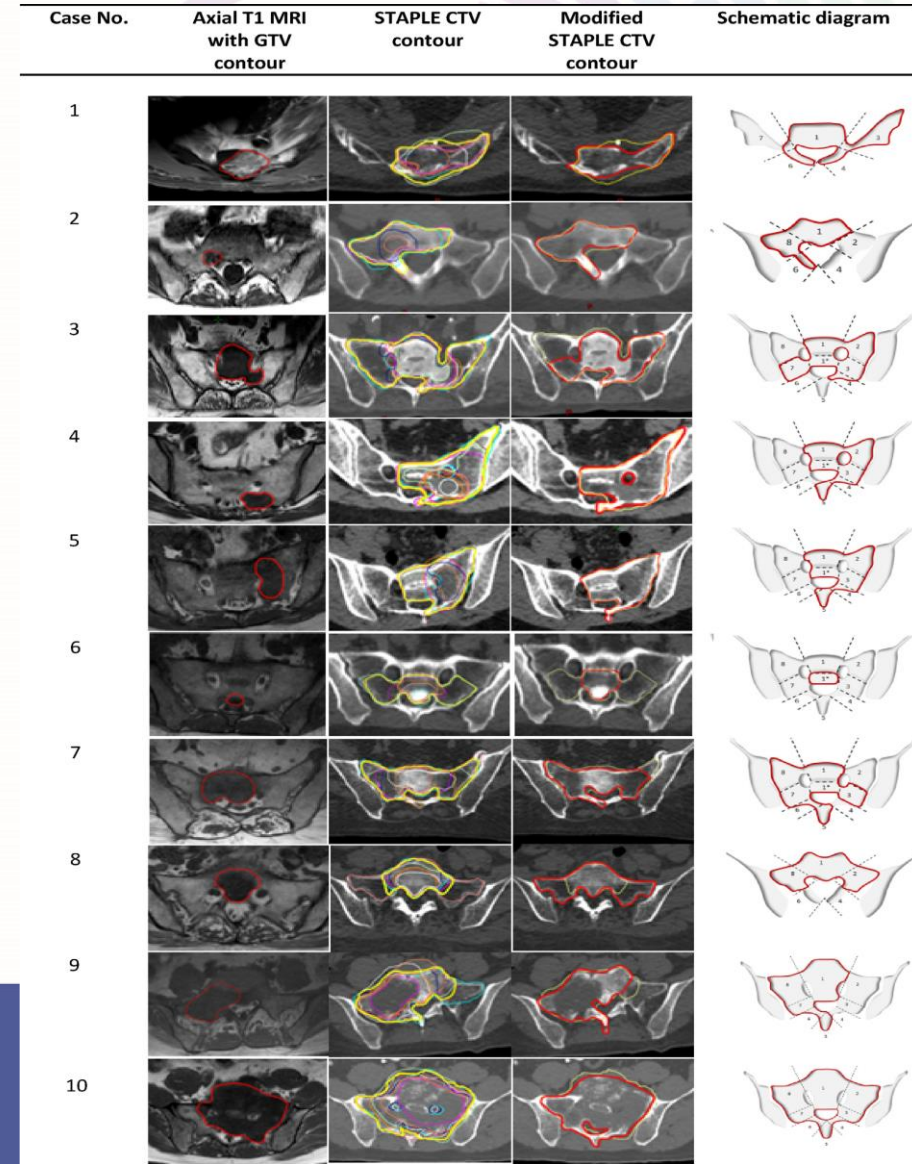
Table 3
Recommendations for target volume definition of the sacrum in spinal stereotactic body radiation therapy/stereotactic radiosurgery (SBRT/SRS).

| GTV involvement | Sacrum anatomic Map classification | Sacrum bony CTV recommendation | CTV description |
|---|------------------------------------|--------------------------------|--|
| Any portion of the VB | 1 | 1 | Entire VB |
| Lateralised within the VB (S1–S2)* | 1 | 1, 2, 3 | Entire VB and the ipsilateral ala. When contouring the ala, use the ossification line if visible to limit the extent of the CTV. The superior and inferior extent of the CTV is determined by the superior and inferior extent of the adjacent VB [†] |
| Lateralised within the VB (S3–S5)* | 1 | 1, 3 | Entire VB and the ipsilateral posterior ala. The superior and inferior extent of the CTV is determined by the superior and inferior extent of the adjacent VB |
| Diffusely involves the VB (S1–S2)* | 1 | 1, 2, 3, 7, 8 | Entire VB and bilateral alae. When contouring the ala, use the ossification line if visible to limit the extent of the CTV. The superior and inferior extent of the CTV is determined by the superior and inferior extent of the adjacent VB [†] |
| Diffusely involves the VB (S3–S5)* | 1 | 1, 3, 7 | Entire VB, bilateral posterior ala. The superior and inferior extent of the CTV is determined by the superior and inferior extent of the adjacent VB |
| GTV involves VB and unilateral ala (S1–S2)* | 1, 2, 3 | 1, 2, 3, 4 | Entire VB, ipsilateral ala and ipsilateral lamina. The superior and inferior extent of the CTV is determined by the superior and inferior extent of the adjacent VB [†] |
| GTV involves VB and unilateral ala (S3–S5)* | 1, 3 | 1, 3, 4 | Entire VB, ipsilateral posterior ala and ipsilateral lamina. The superior and inferior extent of the CTV is determined by the superior and inferior extent of the adjacent VB |
| GTV involves VB and bilateral ala (S1–S2)* | 1, 2, 3, 7, 8 | 1, 2, 3, 4, 6, 7, 8 | Entire VB, bilateral alae and bilateral laminae. The superior and inferior extent of the CTV is determined by the superior and inferior extent of the adjacent VB [†] |
| GTV involves VB and bilateral ala (S3–S5)* | 1, 3, 7 | 1, 3, 4, 6, 7 | Entire VB, bilateral posterior alae and bilateral laminae. The superior and inferior extent of the CTV is determined by the superior and inferior extent of the adjacent VB |
| GTV involves the unilateral ala (S1–S2)* | 2, 3 | 2, 3, ±1 | Entire ipsilateral ala ± the entire adjacent VB. The superior and inferior extent of the CTV is determined by the superior and inferior extent of the adjacent VB [†] |
| GTV involves unilateral lamina | 4 | 4, 5, ±1 | Ipsilateral lamina, spinous process ± VB |
| GTV involves bilateral laminae | 4, 6 | 4, 5, 6, ±1 | Bilateral laminae, spinous process ± VB |
| GTV involves spinous process | 5 | 4, 5, 6 | Spinous process and bilateral laminae |

Abbreviations: GTV, gross tumour volume; CTV, clinical target volume, VB, vertebral body, S1–S2 denotes sacral vertebral levels 1 and 2, S3–S5 denotes sacral vertebral levels 3, 4 and 5.

*The sacrum is a variable bone and at the level of S3, the ala may only be identified as having one segment.

†The exception is if the GTV involves any part of the S1 ala. Please see text for further discussion.



1.º Simposio ACRO-ALATRO de Radioterapia Estereotáctica y Radiocirugía

GRACIAS

linalo40@msn.com

lloaiza@clnicasomer.com

