

PROTOCOLOS DE IGRT



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IGRT

PRECISIÓN



**DOSIS AL
VOLUMEN
TUMORAL**



**DAÑO A
ORGANOS
ADYACENTES**

VERIFICACIÓN GEOMETRICA

REFERENCIA

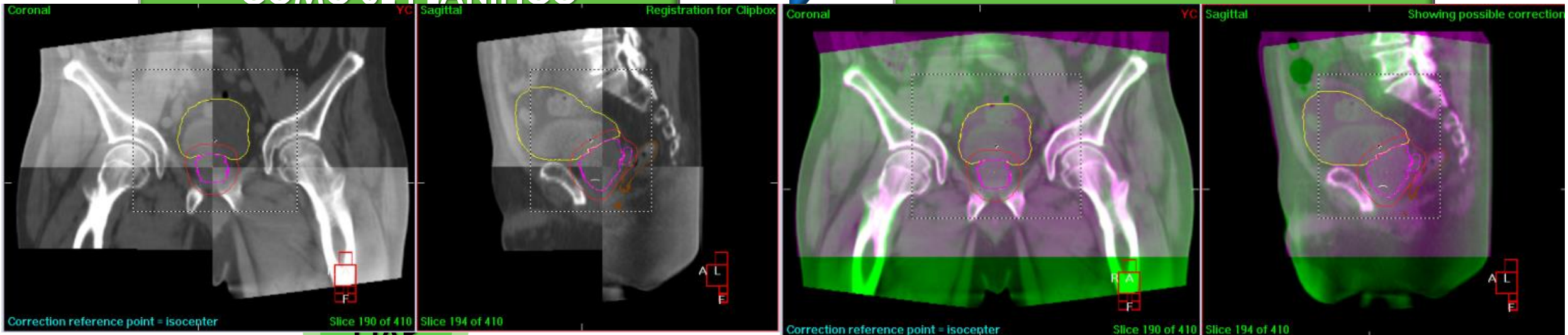
QUE PE
EN TU
COMO SE PLANIFICO

LOCALIZACION



DOSIS CORRECTA

SUPERPOSICION



SOBREDOSIS AL OAR

ERROR EN RADIOTERAPIA

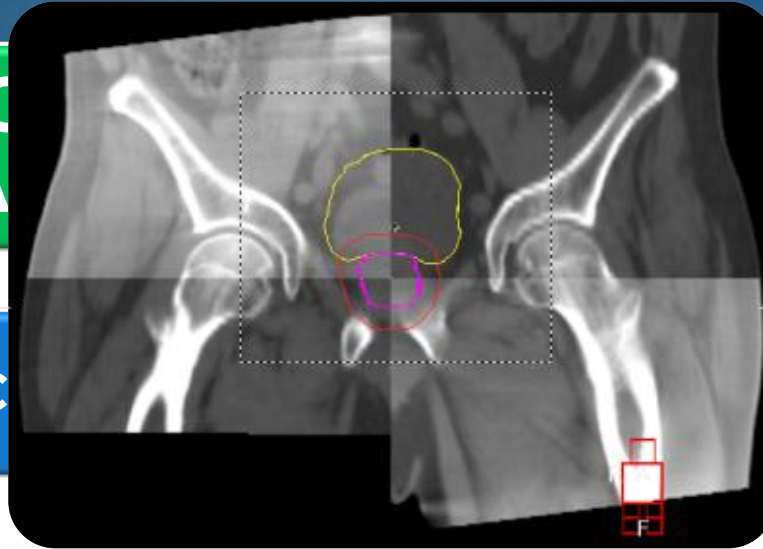
DISC
A

DERA
GÍA

IGRT

PLANIFIC

TAMIENTO



PREVENIR

IDENTIFICAR

CORREGIR

ERRORES

SETUP ERROR

DIFERENCIA DE POSICIÓN
DEL OBJETIVO

PLANIFICACIÓN

TRATAMIENTO

ERROR SISTEMÁTICO: Σ

ERROR ALEATORIO: σ

MARGENES DE PTV

MARGENES **ERRORES**
CUBRIR EL OBJETIVO CON LA
MAYOR PRECISIÓN POSIBLE

VAN HERK

PTV: $2.5\Sigma + 0.7\sigma$

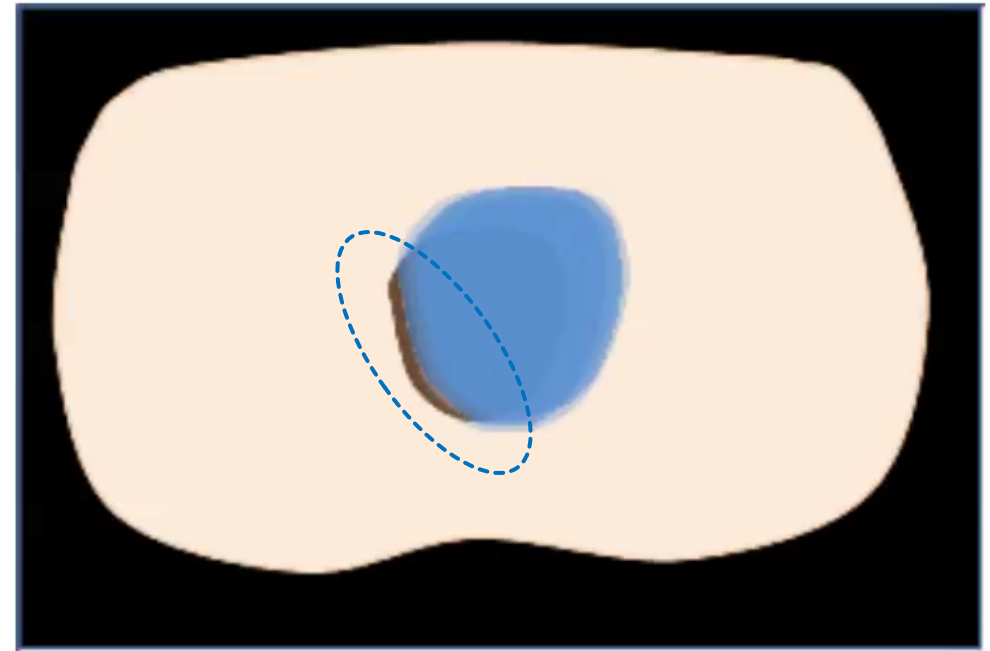
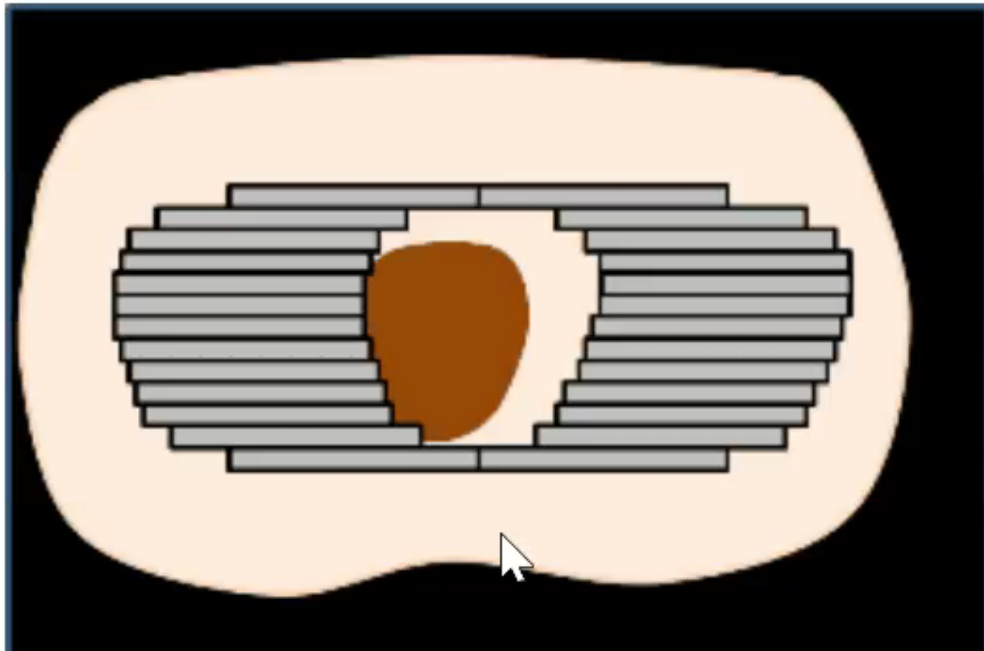


ERROR SISTEMÁTICO

VARIACIÓN

ENTRE PLANIFICACIÓN Y TRATAMIENTO

ARIAMENTE

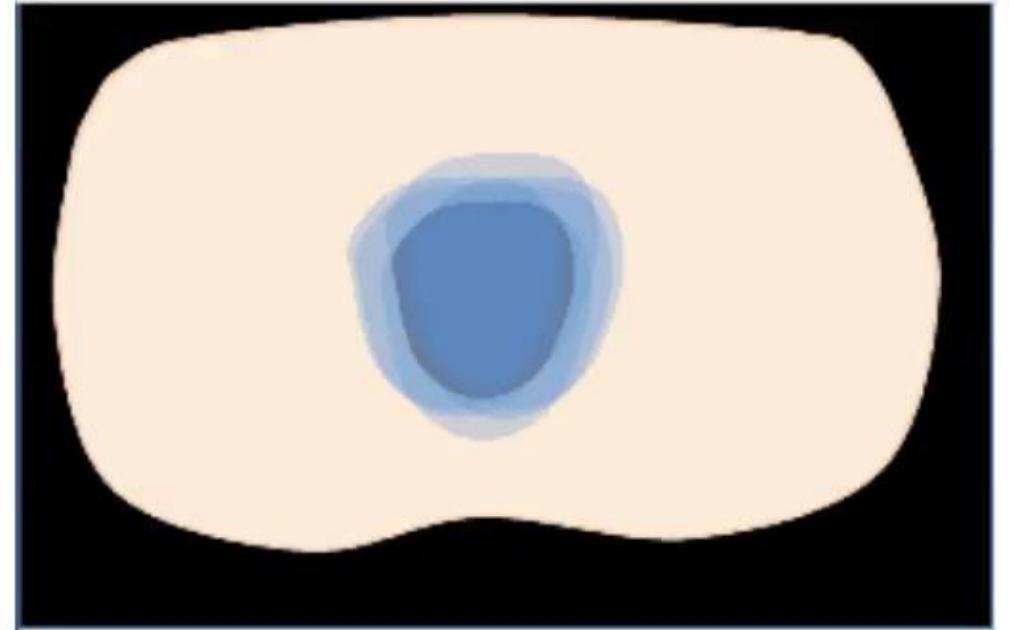
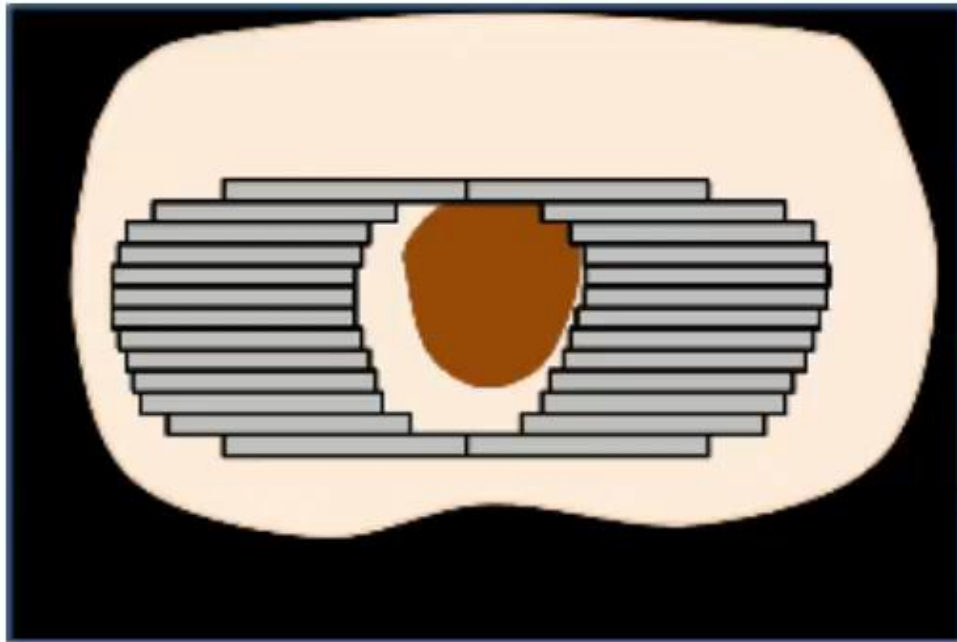


ERROR ALEATORIO

VARIACIÓN DE

REPOSICIONAMIENTO DIARIO

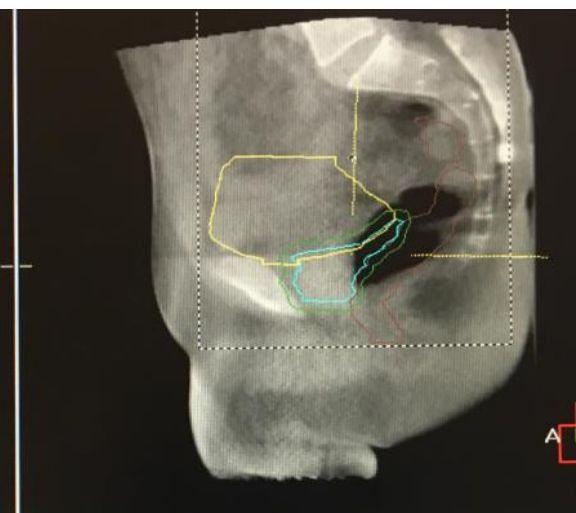
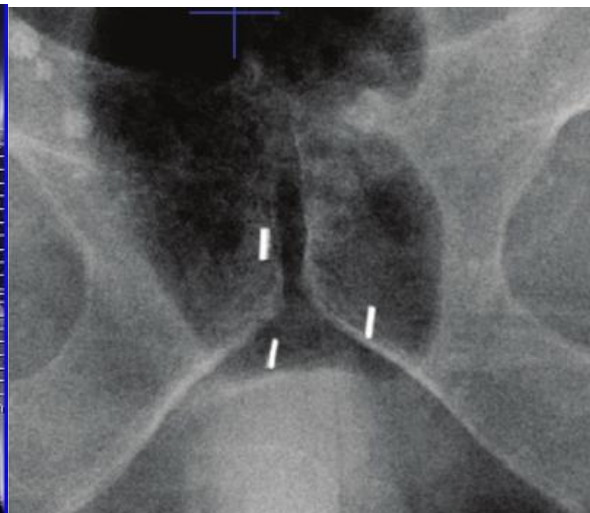
CADA FRACCIÓN



INEN

IMAGEN
PLANAR

CBCT



PROTOSCOLOS DE VERIFICACIÓN

PROTOSCOLO ONLINE

Comparación de las imágenes de localización inmediatamente antes de que el tratamiento empiece a entregarse.

Cualquier corrección necesaria se aplica antes de que el tratamiento se entregue.

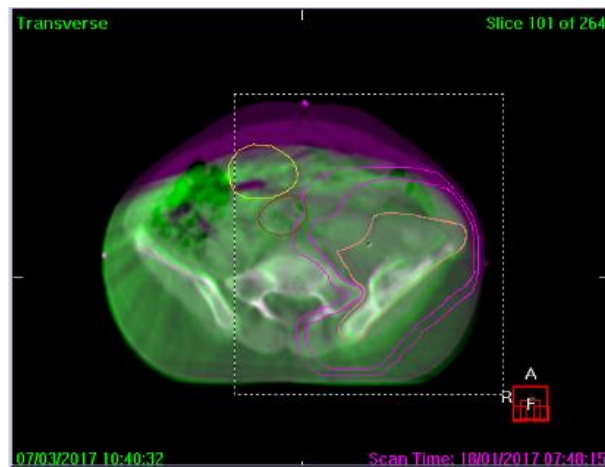
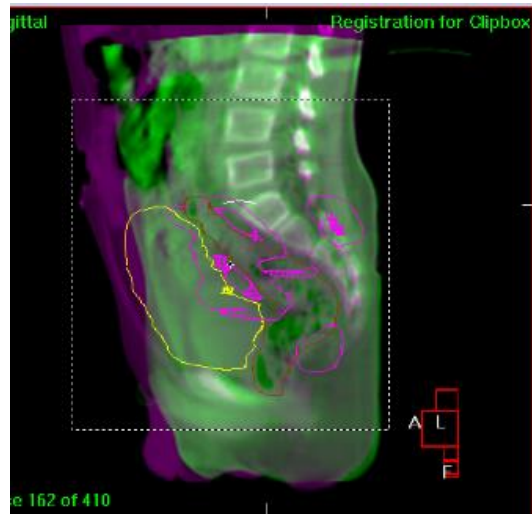
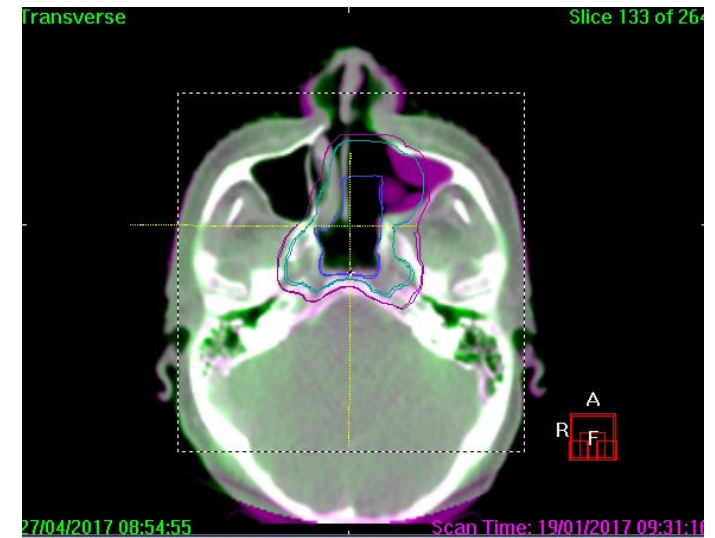
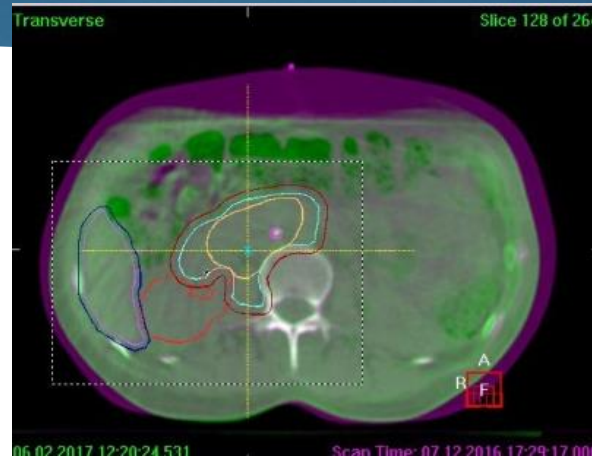
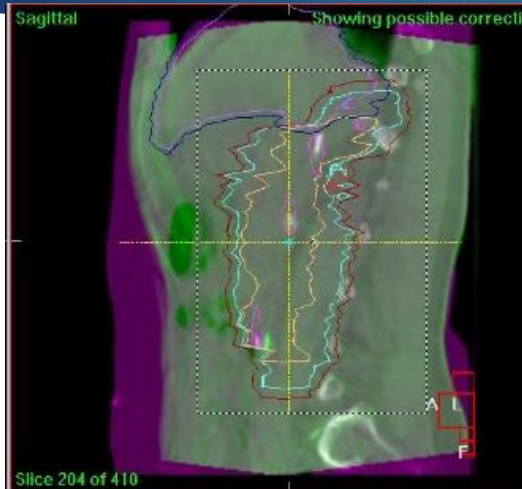
Hipofraccionamiento, sitios sin buena inmovilizador

PROTOSCOLO OFFLINE

Comparación de imágenes de referencia y localización y analiza la exactitud del setup algún tiempo DESPUES de que el tratamiento se ha realizado.

La información del set up no se corrige hasta el siguiente tratamiento.

CAMBIOS EN LA ANATOMIA



PROTOCOLO DE CORRECCIÓN

SNC



Coronal

Sagittal

Registration for Clipbox

Image

ISO TAC

patient

- LECHO QX
- 21 CRISTALIN D
- 22 CRISTALIN I
- 23 CP GO D
- 24 CP GO I
- 28 COCLEA D
- 29 COCLEA I
- 30 CAI D
- 31 CAI I
- 44 HIPOFISIS
- 50 MEDULA
- 51 NO D
- 52 NO I
- 63 QUIASMA
- 70 TRONCO

CTV 54

PTV 54

- PRV MEDULA
- PRV NOD
- PRV NOI
- PRV QUIASMA
- PRV CRISTALINO DER
- PRV CRISTALINO IZQ
- PRV HIPOFISIS
- PRV TRONCO
- Foam Core
- Carbon Fiber
- TRONCO OPTI

Reference

Registration (Clipbox)

Reference image review

Scan Time: 24.02.2017 00:09:07 Approved

Treatment: 1:11394 Plan Date: 20.03.2017 16:25:17.000 Plan Description: MEDULOBLASTOMA

Coronal VC Sagittal Showing possible correction Image

Correction reference point = Isocenter Slice 128 of 270

Correction reference point = Isocenter Slice 160 of 270

Transverse Slice 135 of 264

Reference

Scan Cor Plan
 Clipbox Structures
 Mask

Protocol

Registration:
Correction from:
Correction by:

Correction

Position Error		Table Correction	
Translation (cm)		(cm)	
X	0.19	Lat	-0.18
Y	0.07	Long	0.07
Z	0.04	Vert	0.04

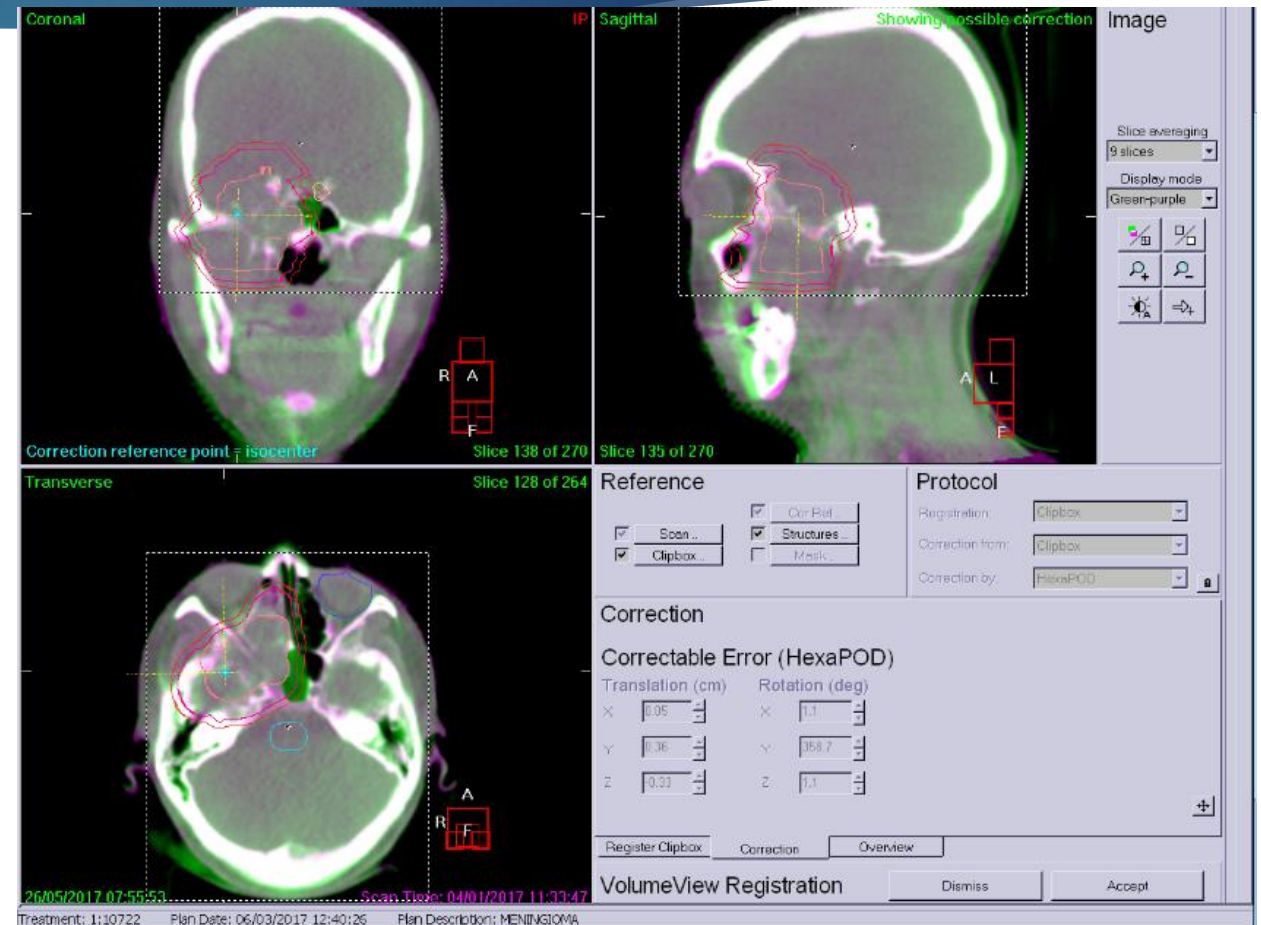
Register Clipbox

VolumeView Registration

26.04.2017 09:01:13.734 Scan Time: 24.02.2017 10:09:07.000

Treatment: 1:11394 Plan Date: 20.03.2017 16:25:17.000 Plan Description: MEDULOBLASTOMA

HEXAPOD



Coronal

Correction reference point = isocenter

Slice 138 of 270

Sagittal

Showing possible correction

Slice 135 of 270

Transverse

Slice 126 of 264

Reference

Scan... Cor Ref. Mask

Clipbox... Structures...

Protocol

Registration: Clipbox

Correction from: Clipbox

Correction by: HexaPOD

Correction

Correctable Error (HexaPOD)

Translation (cm)		Rotation (deg)	
X	Y	X	Y
0.05	0.36	1.1	358.7
-0.33		1.1	

26/05/2017 07:55:53 Scan Time: 04/01/2017 11:33:47

Treatment: 1:10722 Plan Date: 06/03/2017 12:40:26 Plan Description: MENINGIOMA

TOLERANCIAS

PRECISE TABLE

TRASLACIONAL	ROTACIONAL
< 2mm	1°

HEXAPOD

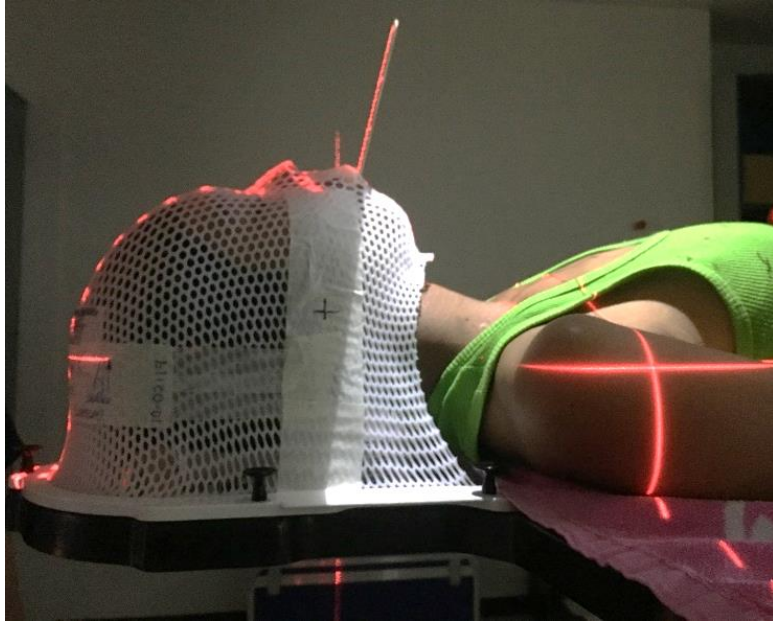
TRASLACIONAL	ROTACIONAL
< 2mm	2°

NIVELES DE ACCIÓN

FRACCION	X	Y	Z
4	0.1	0.2	-0.1
5	-0.1	0.1	0

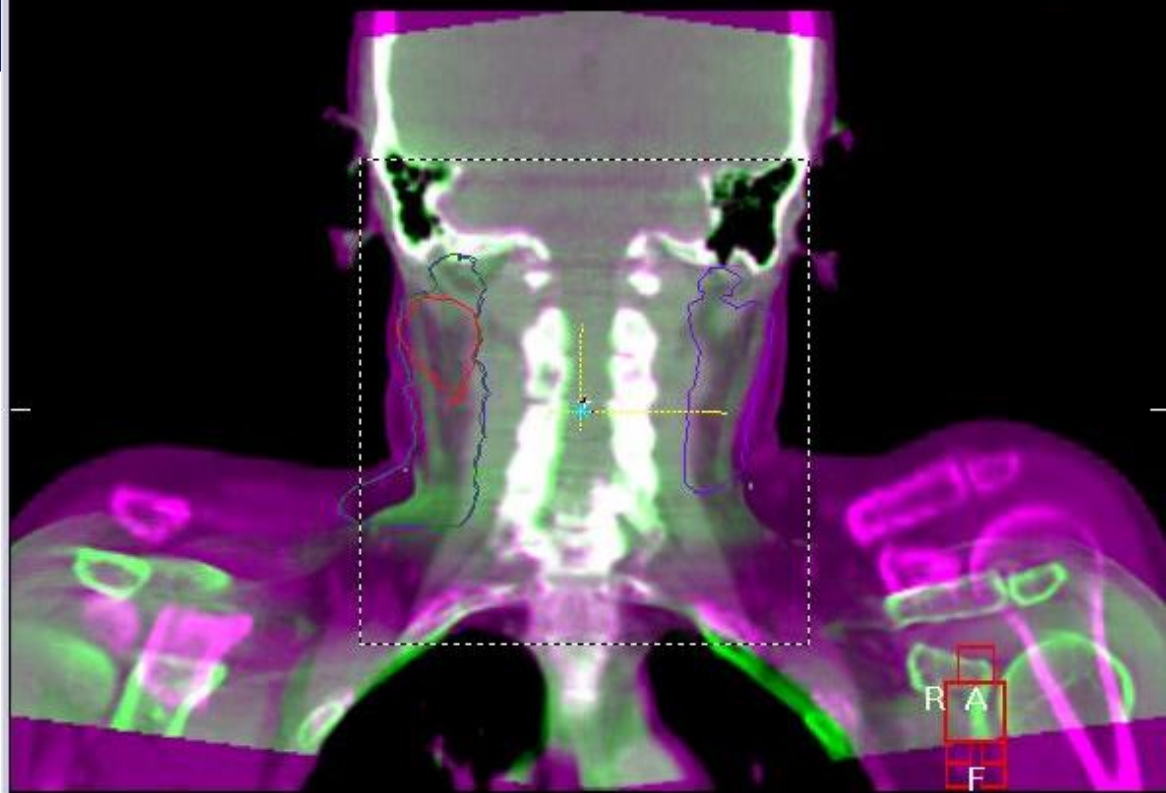


CABEZA Y CUELLO



Coronal

No previous alignment

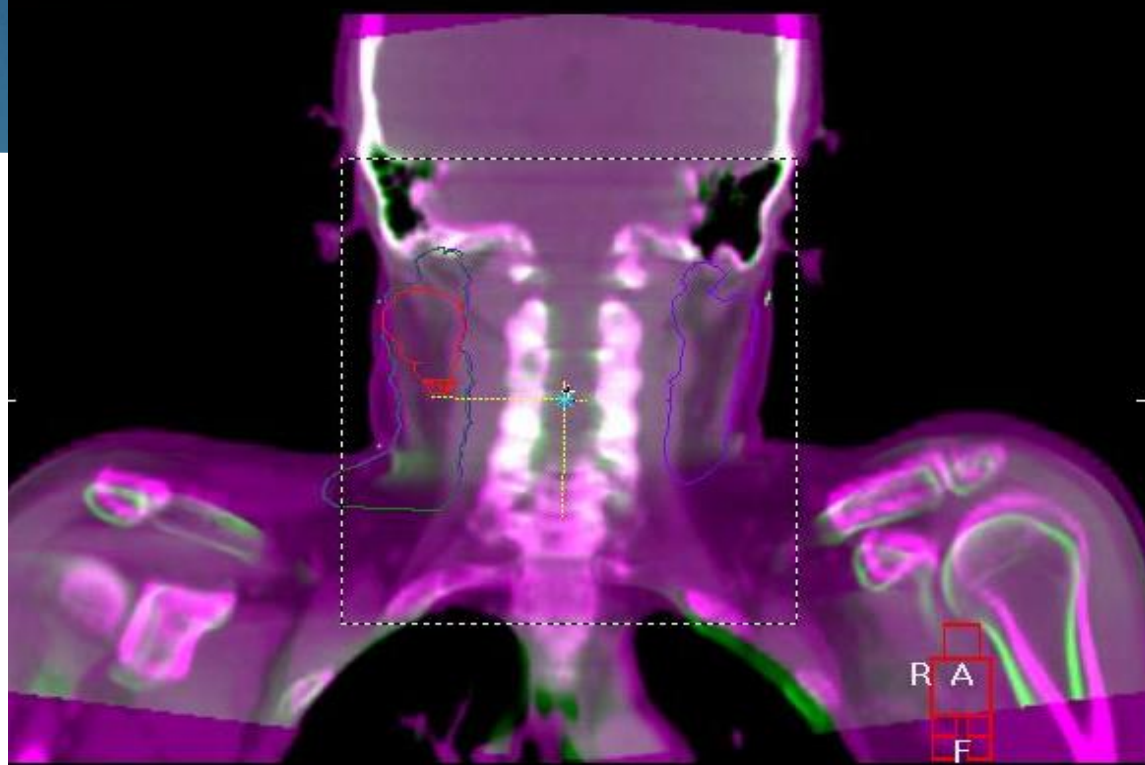


Correction reference point = isocenter

Slice 207 of 410

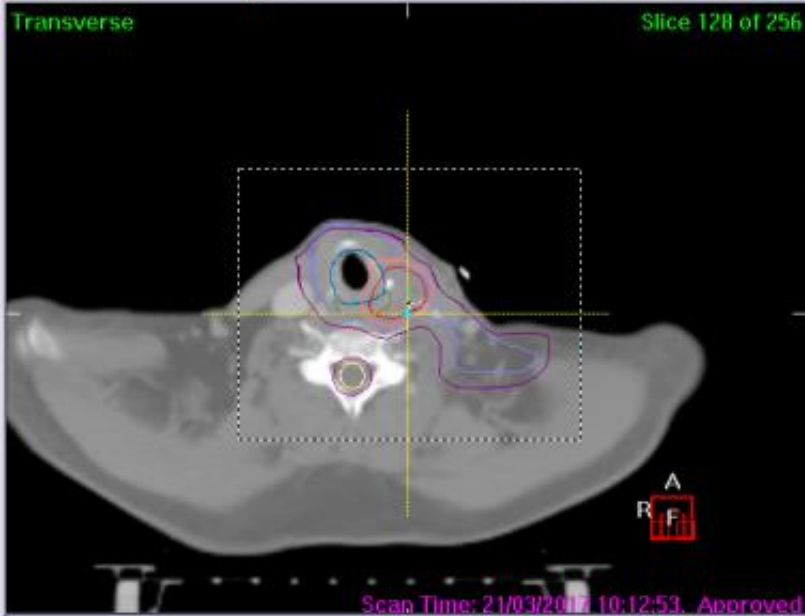
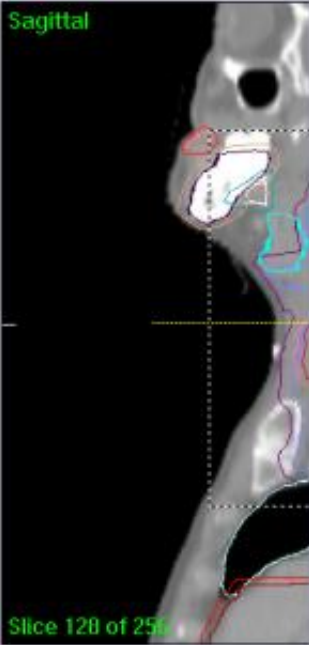
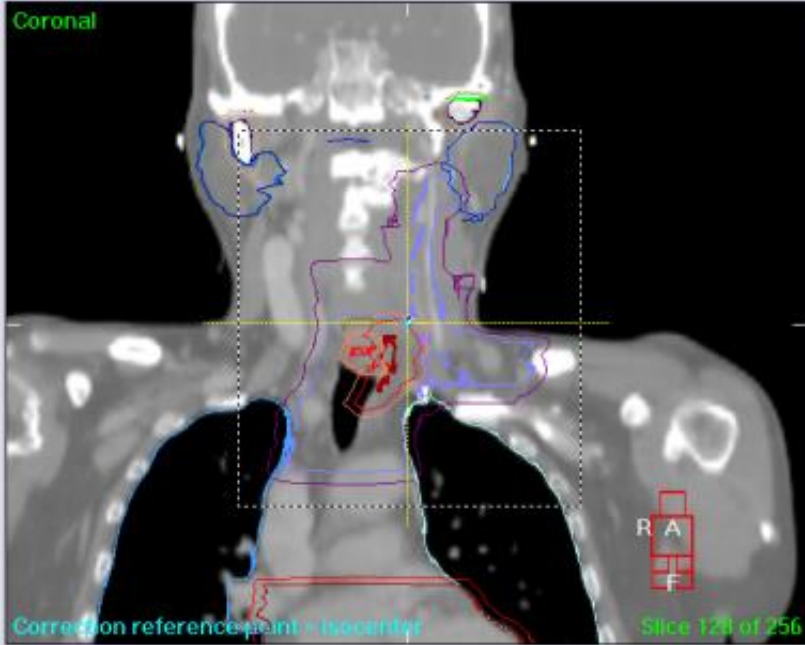
Coronal

IP



Correction reference point = isocenter

Slice 207 of 410



Reference

Scan... Cor I
 Clipbox... :Struct
 M...

Registration (Clipbox)

Register Clipbox

Reference image review

- ISO TAC
- patient
- 01 GTV T
- 03 CTV 54
- 05 CTV 66
- 06 PTV 54
- 08 PTV 66
- 26 CAVID ORAL
- 32 MC FARINGEO
- 35 ESOFAGO
- 39 G SUBM D
- 40 G SUBM I
- 46 LARINGE
- 49 MANDIBULA
- 50 MEDULA
- 55 PAROTIDA D
- 56 PAROTIDA I
- 70 TRONCO
- ATM DER
- ATM IZQ
- CAI DER
- COCLEA DER
- CAI IZQ
- COCLEA IZQ
- AG OVAL DER
- AG OVAL IZQ
- LABIOS
- PULMON DER
- PULMON IZQ
- CORAZON
- PRV CO
- PRV MEDULA
- PRV TRONCO
- PRV OID
- PRV OII
- PRV MANDIBULA
- PRV LABIOS

Color Clipbox Image

Slice averaging
9 slices

Display mode
Green-purple

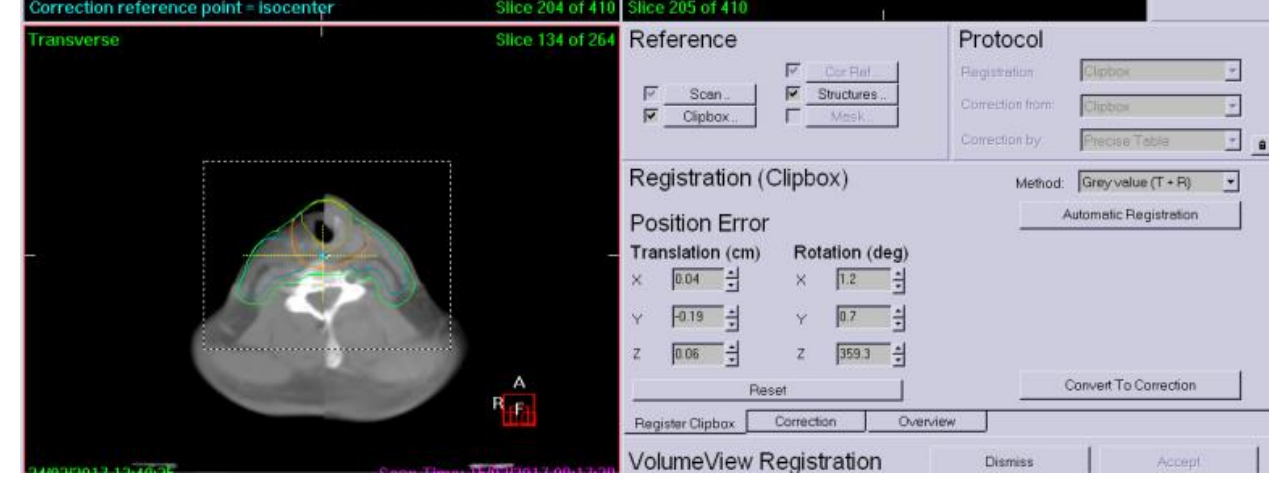
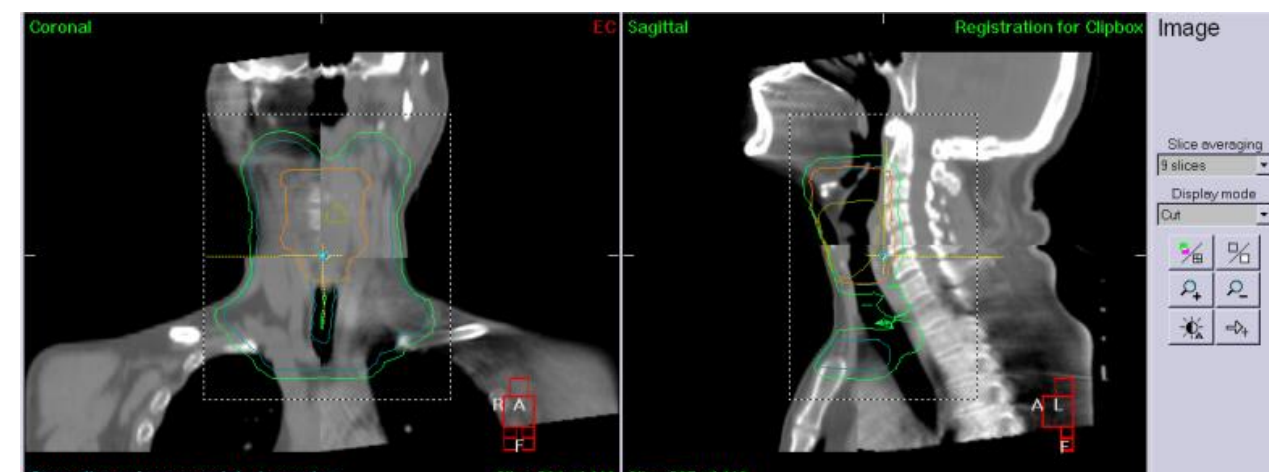
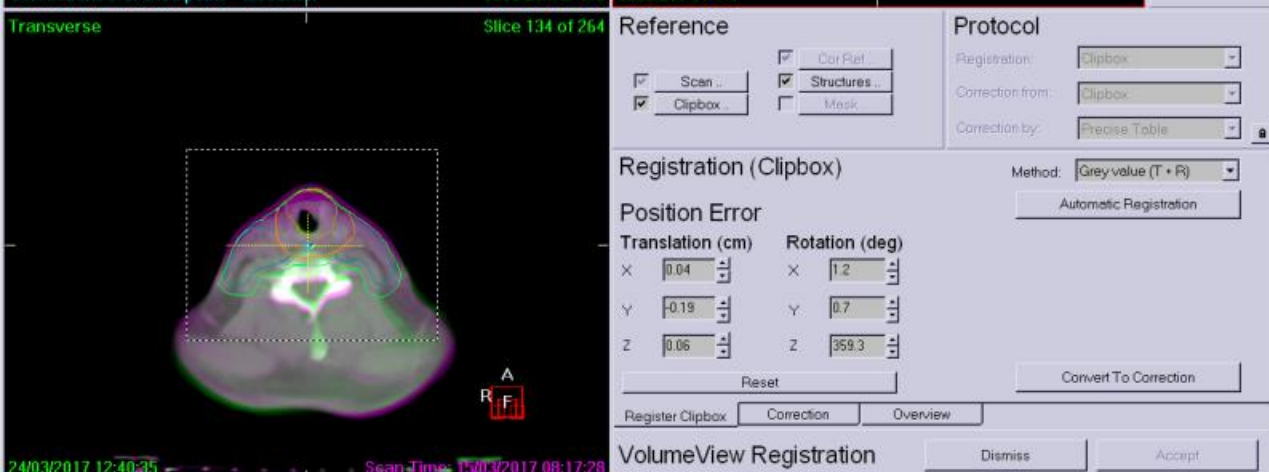
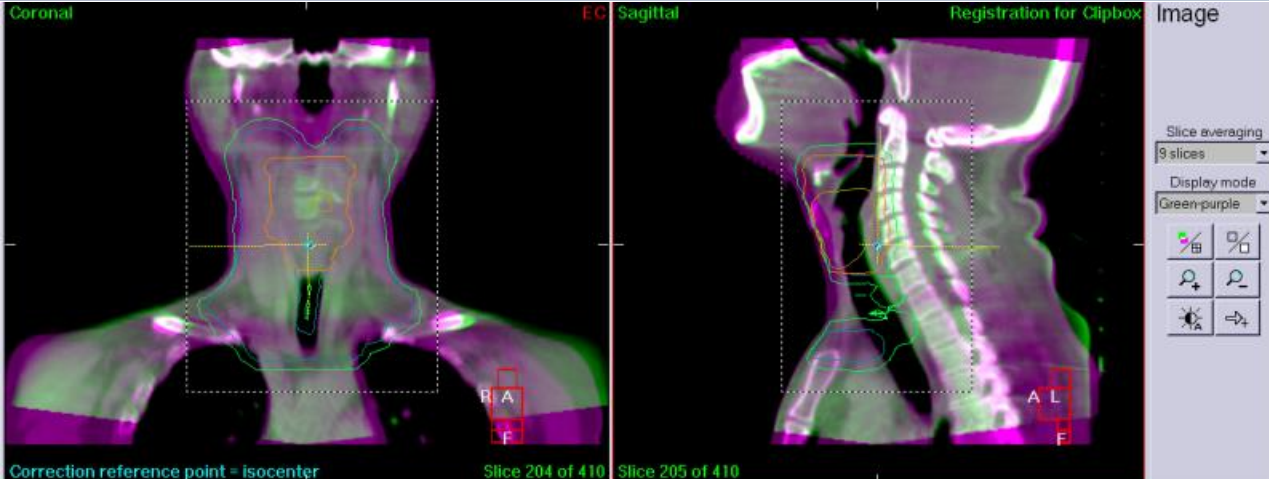
Clipbox

Clipbox

Precise Table

Mod: Grey value (T + R)

Accept



Coronal

Correction reference point = isocenter

Slice 204 of 410

Sagittal Showing possible correction

Slice 205 of 410

Transverse

Slice 134 of 264

Reference

Scan .. Cor Ref ..

Clipbox .. Structures ..

Mask ..

Protocol

Registration:

Correction from:

Correction by:

Correction

Position Error		Table Correction (cm)	
Translation (cm)			
X	<input type="text" value="0.04"/>	Lat	-0.04
Y	<input type="text" value="-0.19"/>	Long	0.19
Z	<input type="text" value="0.06"/>	Vert	-0.06

VolumeView Registration

Register Clipbox Correction Overview

Dismiss Accept

24/03/2017 12:40:35

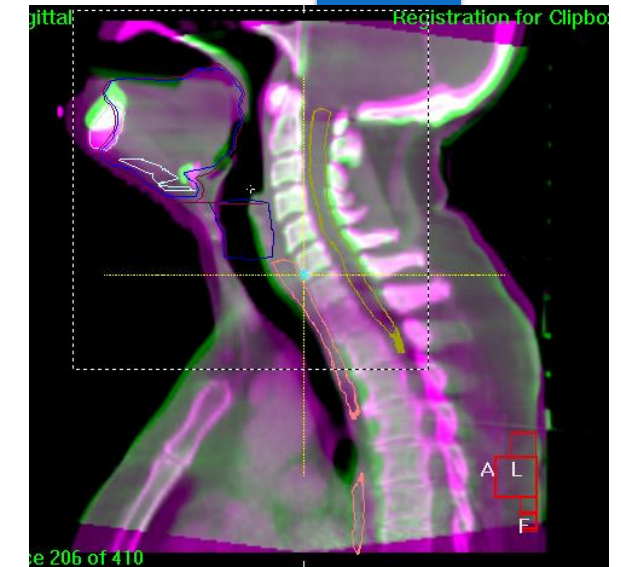
Scan Time: 15/03/2017 08:17:28

TOLERANCIAS

PRECISE TABLE

TRASLACIONAL	ROTACIONAL
< 3mm	1°

TOLERANCIAS



NIVEL VERDE

- Cambio en el contorno 0 – 0.5cm

NIVEL AMARILLO

- Cambio en el contorno 0.5 - 1 cm

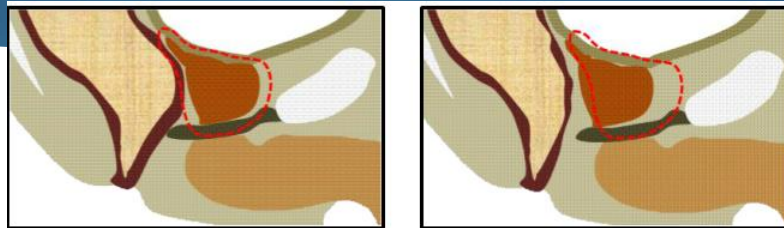
NIVEL NARANJA

- Cambio en el contorno 1 - 1.5 cm

NIVEL ROJO

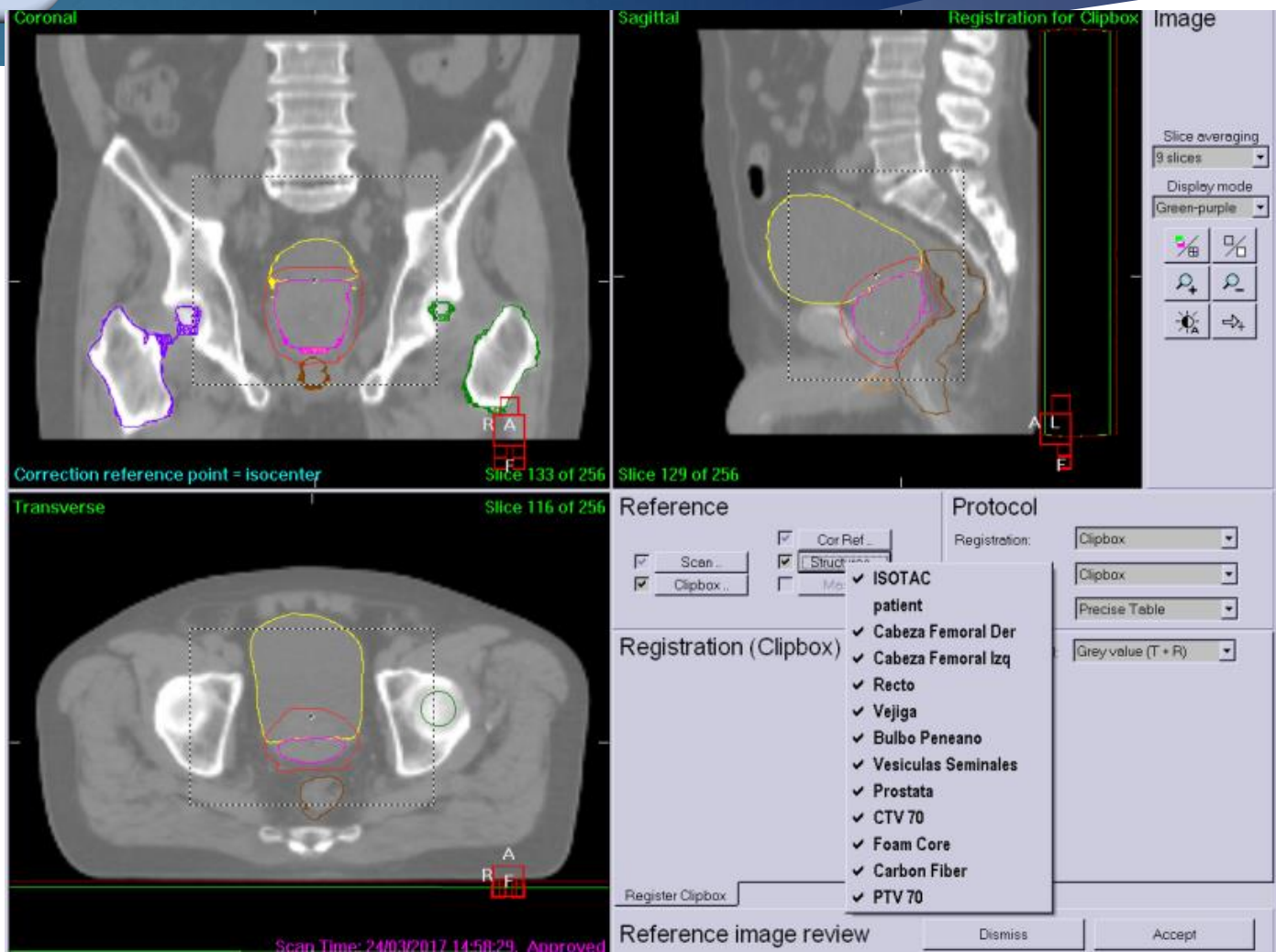
- Cambio en el contorno > 1.5 cm

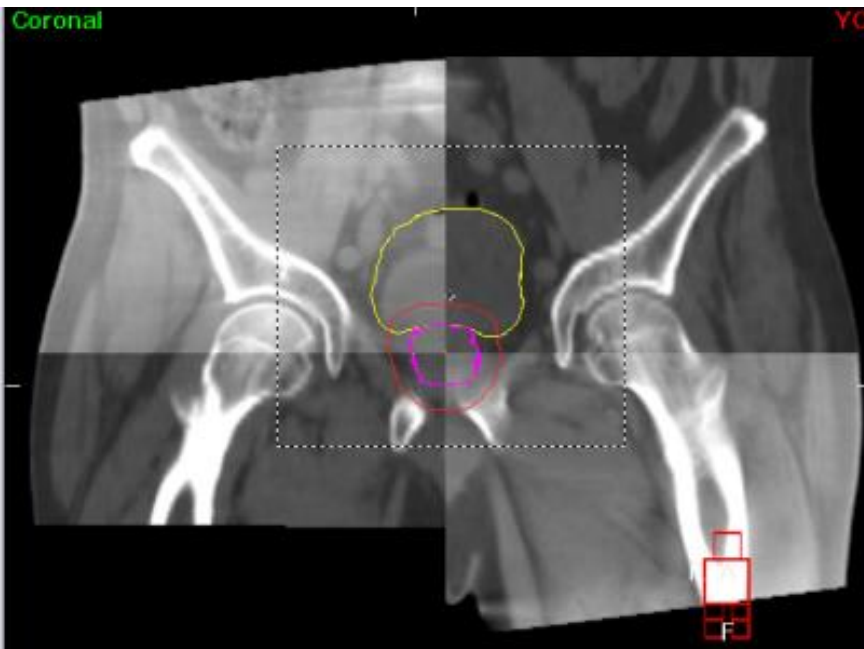
PROSTATA



CLIPBOX:

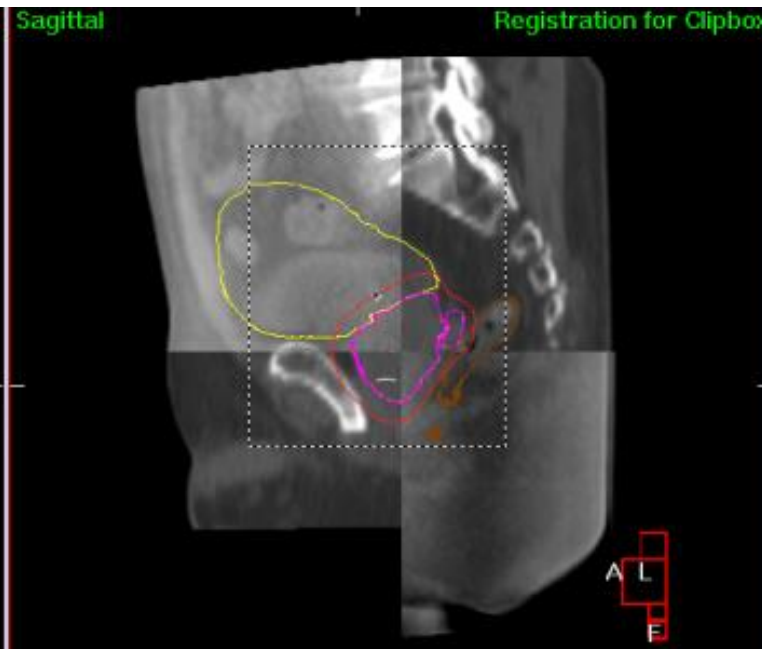
- Debe incluir todo el PTV, CTV, OAR (recto, vejiga).
- Debe ser lo más pequeño posible
- Excluir las cabezas femorales.



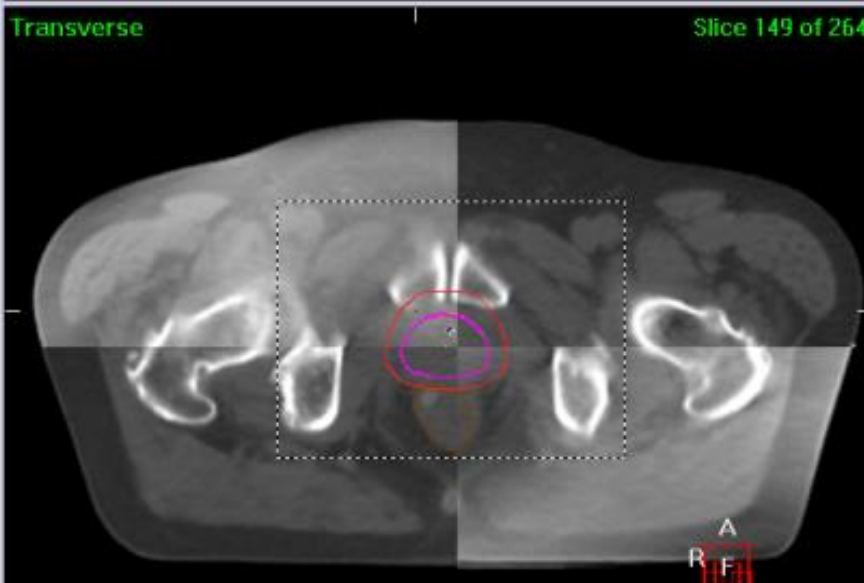


Correction reference point = isocenter

Slice 190 of 410



Slice 194 of 410



Slice 149 of 264

21/06/2017 07:55:24

Scan Time: 24/03/2017 14:58:29

Registration for Clipbox Image

Slice averaging
9 slices

Display mode
Cut

Reference

Scan
 Clipbox

Cor Ref
 Structures
 Mask

Protocol

Registration: Clipbox

Correction from: Clipbox

Correction by: Precise Table

Registration (Clipbox)

Method: Grey value (T + R)

Automatic Registration

Position Error

Translation (cm)		Rotation (deg)	
X	0.28	X	358.8
Y	-0.07	Y	0.5
Z	-0.07	Z	0.4

Reset Convert To Correction

Register Clipbox Correction Overview

VolumeView Registration

Dismiss Accept

Coronal **YC** **Sagittal** **Showing possible correction** **Image**

Correction reference point = isocenter Slice 190 of 410

Transverse Slice 149 of 264

Reference **Protocol**

Scan... Cor Ref... Registration:

Clipbox... Structures... Correction from:

Mask... Correction by:

Correction

Position Error		Table Correction (cm)	
Translation (cm)	Rotation (deg)	Lat	Long
X: <input type="text" value="0.28"/>	X: <input type="text" value="0.0"/>	-0.28	0.07
Y: <input type="text" value="-0.07"/>	Y: <input type="text" value="0.0"/>	0.07	0.07
Z: <input type="text" value="-0.07"/>	Z: <input type="text" value="0.0"/>	0.07	

Register Clipbox Correction Overview

VolumeView Registration Dismiss Accept

21/06/2017 07:55:24 Scan Time: 24/03/2017 14:58:29

Coronal **IP** **Sagittal** **Showing possible correction** **Image**

Correction reference point = isocenter Slice 212 of 410

Transverse Slice 97 of 264

Reference **Protocol**

Scan... Cor Ref... Registration:

Clipbox... Structures... Correction from:

Mask... Correction by:

Correction

Position Error		Table Correction (cm)	
Translation (cm)	Rotation (deg)	Lat	Long
X: <input type="text" value="0.33"/>	X: <input type="text" value="0.0"/>	-0.33	0.32
Y: <input type="text" value="-0.32"/>	Y: <input type="text" value="0.0"/>	0.32	0.24
Z: <input type="text" value="-0.24"/>	Z: <input type="text" value="0.0"/>	0.24	

Register Clipbox Correction Overview

VolumeView Registration Dismiss Accept

21.02.2017 07:43:06.921 Scan Time: 25.11.2016 17:40:57.000

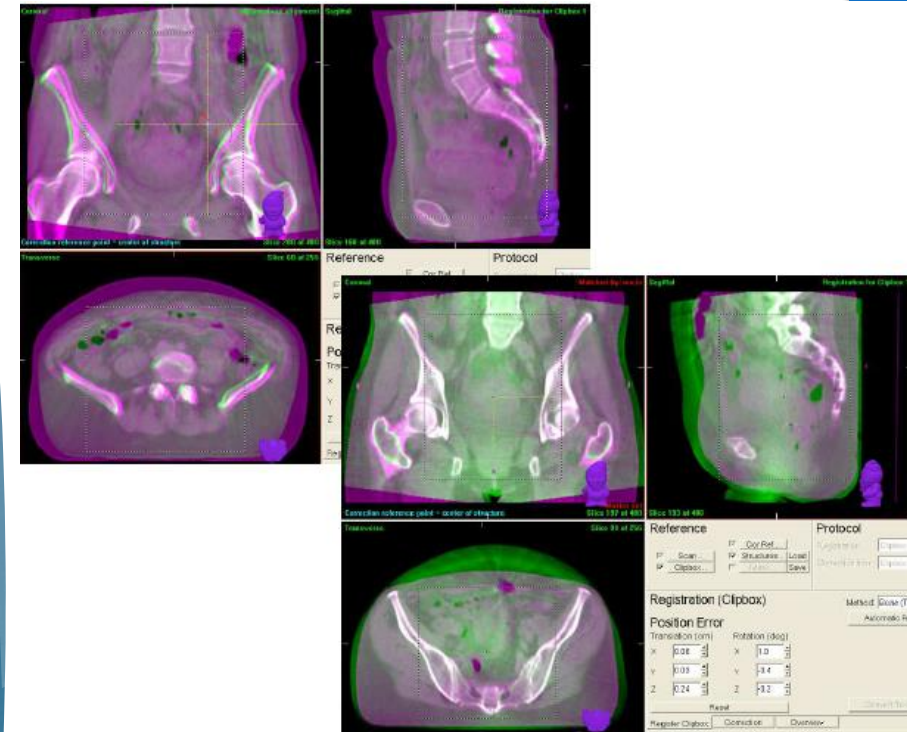
Treatment: 1:10357 Plan Date: 13.01.2017 11:04:21.000 Plan Description: PROSTATA

TOLERANCIAS

PRECISE TABLE

TRASLACIONAL	ROTACIONAL
< 3mm	2°

TOLERANCIAS



NIVEL VERDE

- Cambio en el contorno < 1 cm

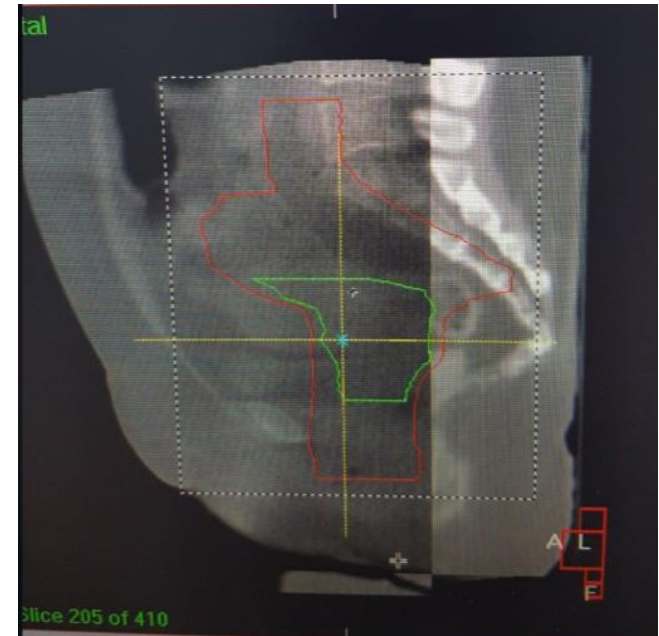
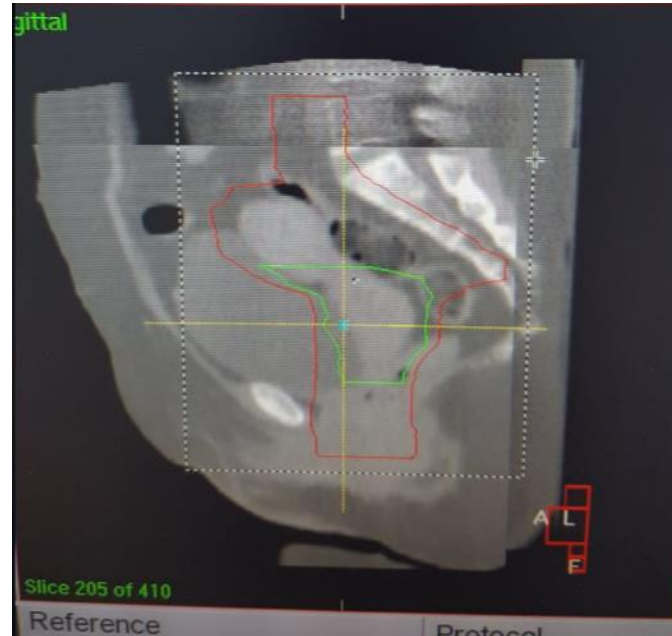
NIVEL NARANJA

- Cambio en el contorno 1 – 2 cm

NIVEL ROJO

- Cambio en el contorno > 2cm

CÉRVIX



Coronal

ip Sagittal

Registration for Clipbox Image

Transverse

Reference Protocol

Registration (Clipbox)

Position Error

VolumeView Registration

10/20/2022 2:51:15 PM Scan Time: 10/5/2022 4:24:50 PM

Plan ID: 1-1363 Plan Date: 10/11/2022 8:47:33 AM Plan Description: AP 2M9.2PM

Correction reference point = Isocenter

Slice 181 of 410

Slice 214 of 410

Slice 224 of 264

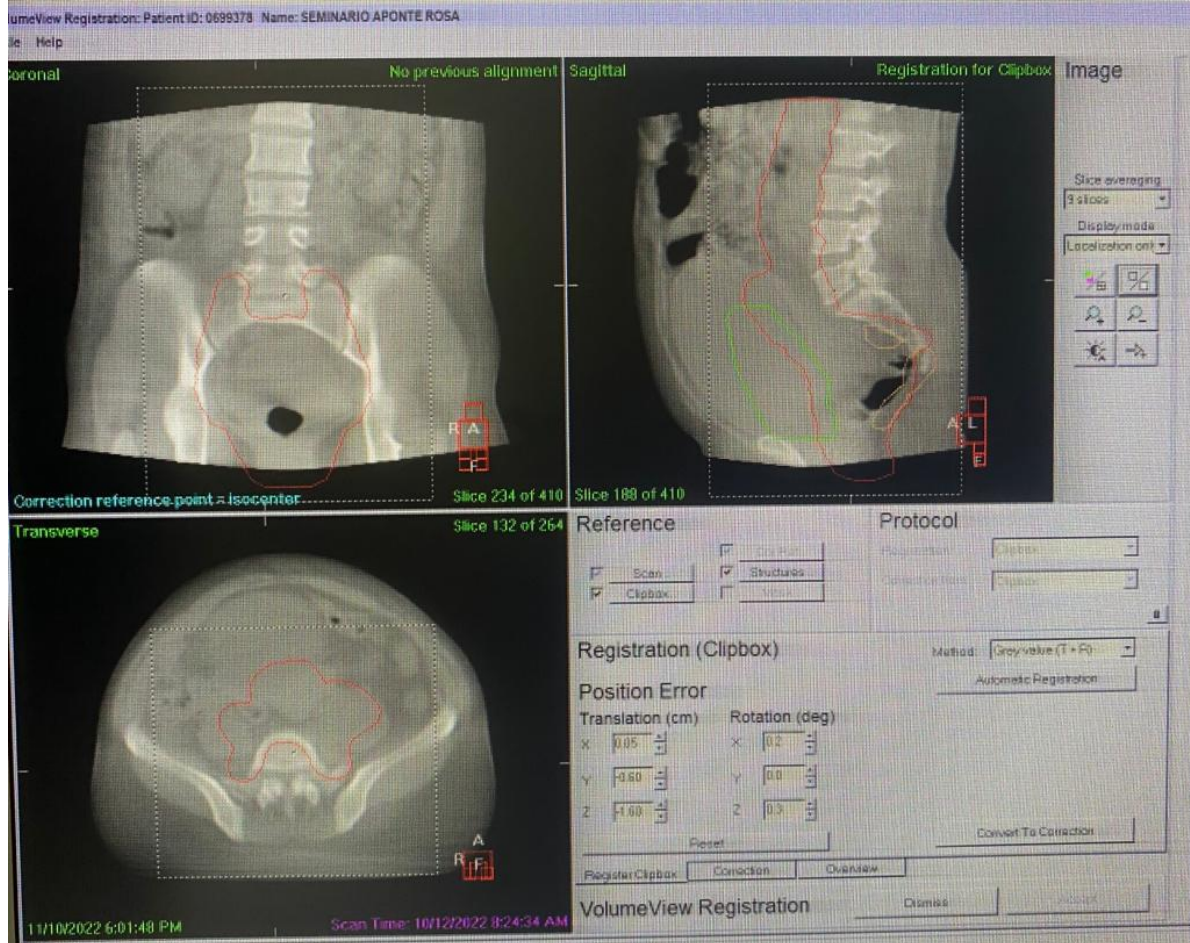
Method: Manual

Manual Registration on viewer

Position Error	
Translation (cm)	Rotation (deg)
X: 0.00	X: 0.0
Y: 0.05	Y: 0.0
Z: 0.17	Z: 0.0

Register Clipbox Correction Overview

Dismiss Accept

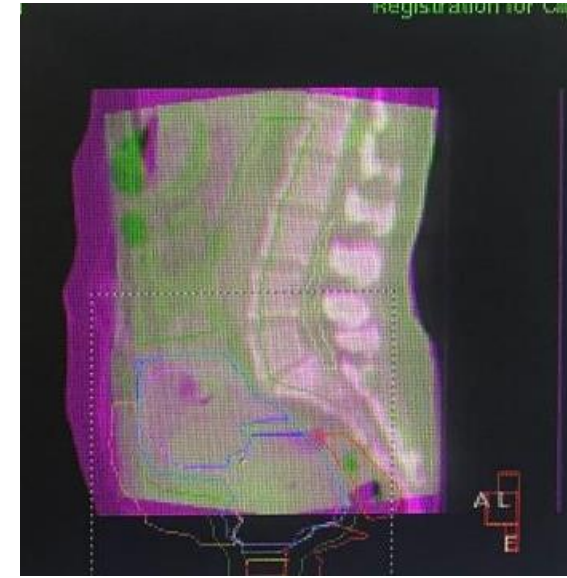


TOLERANCIAS

PRECISE TABLE

TRASLACIONAL	ROTACIONAL
< 3mm	2°

TOLERANCIAS



NIVEL VERDE

- Cambio en el contorno < 1 cm

NIVEL NARANJA

- Cambio en el contorno 1 – 2 cm

NIVEL ROJO

- Cambio en el contorno > 2cm

MAMA

The screenshot displays the MAMA software interface for breast motion correction. The central part of the screen shows a patient lying on a table, with a large registration window overlaid on the image. The patient is wearing a white arm support and a patterned blanket. The registration window is titled "Registration for Clipbox Image" and shows a "Coronal" view of the breast area with various colored overlays (green, yellow, red) indicating the registration process. The text "Correction reference point = isocenter" is visible in the bottom left of this window. To the right of the registration window, there are several control panels. The "Protocol" panel includes options for "Cor.Pel", "Structures", and "Mask", and a "Registration" dropdown set to "Clipbox". The "Correction from:" dropdown is also set to "Clipbox", and the "Correction by:" dropdown is set to "Precise Table". Below this, the "Method:" is set to "Grey value (T + R)" and there is an "Automatic Registration" button. The "Rotation (deg)" panel shows values for X (358.9), Y (0.9), and Z (359.9). At the bottom of the interface, there are two "VolumeView Registration" panels, each with "Reset", "Convert To Correction", "Register Clipbox", "Correction", "Overview", "Dismiss", and "Accept" buttons. The bottom left corner shows the date and time "31/05/2017 11:41:41" and the scan time "Scan Time: 06/02/2017 09:23:14".

Coronal BV Sagittal Registration for Clipbox Image

Correction reference point = isocenter
 Slice 208 of 410
 Slice 120 of 264

Reference

Protocol

Registration (Clipbox)

Position Error

Translation (cm)		Rotation (deg)	
X	0.00	X	0.0
Y	0.00	Y	0.0
Z	0.0	Z	0.0

VolumeView Registration

13.05.2016 11:09:38.201
 Plan Date: 10.05.2016 11:59:43.000
 Plan Description: CA DE MAMA DUCTAL IZQ
 treatment: BOOST DE MAMA

Coronal BV Sagittal Registration for Clipbox Image

Correction reference point = isocenter
 Slice 206 of 410
 Slice 290 of 410

Reference

Protocol

Registration (Clipbox)

Position Error

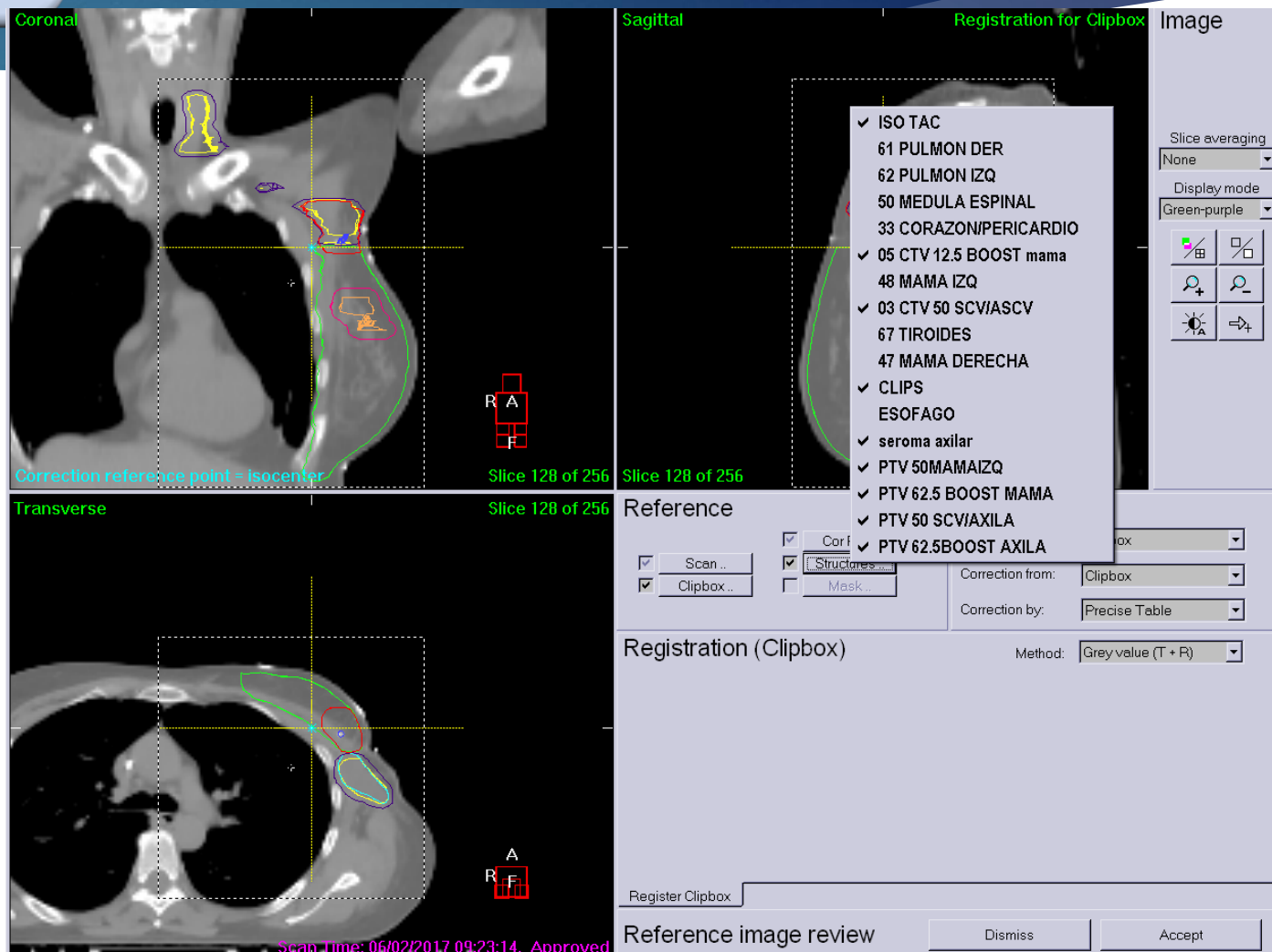
Translation (cm)		Rotation (deg)	
X	0.59	X	0.0
Y	0.86	Y	0.0
Z	0.00	Z	0.0

VolumeView Registration

13.05.2016 11:09:38.201
 Plan Date: 10.05.2016 11:59:43.000
 Plan Description: CA DE MAMA DUCTAL IZQ
 treatment: BOOST DE MAMA

CLIPBOX:

- Debe incluir todo el PTV, CTV, OAR. verificar si se incluye los ganglios axilo y supraclaviculares
- Incluir también tanto tejido mamario como sea posible,
- Debe ser lo más pequeño posible
- Incluir esternón, parte anterior de los cuerpos vertebrales.
- Minimizar la cantidad de humero o escapula





Coronal JA Sagittal Registration for Clipbox Image

Correction reference point = center of structure

Slice 140 of 270

Slice 125 of 270

Transverse

Slice 197 of 264

Reference

Protocol

Registration: Clipbox

Correction from: Clipbox

Registration (Clipbox)

Method: Manual

Position Error

Translation (cm)		Rotation (deg)	
X	0.05	X	0.0
Y	0.19	Y	0.0
Z	-0.38	Z	0.0

VolumeView Registration

Dismiss Accept

16/11/2022 14:28:31 Scan Time: 13/10/2022 15:13:18

Treatment: 1:3567 Plan Date: 07/11/2022 15:40:51 Plan Description: AP LIP1

File Help

Coronal JA Sagittal Registration for Clipbox Image

Correction reference point = center of structure

Slice 139 of 270

Slice 135 of 270

Transverse

Slice 130 of 264

Reference

Protocol

Registration: Clipbox

Correction from: Clipbox

Registration (Clipbox)

Method: Grey value (T)

Automatic Registration

Position Error

Translation (cm)		Rotation (deg)	
X	0.05	X	0.0
Y	0.19	Y	0.0
Z	-0.38	Z	0.0

VolumeView Registration

Dismiss Accept

16/11/2022 14:28:31 Scan Time: 13/10/2022 15:13:18

Treatment: 1:3567 Plan Date: 07/11/2022 15:40:51 Plan Description: AP LIP1



File Help

Coronal **ga jp** Sagittal **Registration for Clipbox** Image

Correction reference point = center of structure

Slice 133 of 270

Slice 132 of 270

Transverse **Reference** **Protocol**

Registration: Clipbox
Correction from: Clipbox

Registration (Clipbox) Method: Grey value (T)

Position Error

Translation (cm)		Rotation (deg)	
X	-0.34	X	0.0
Y	0.09	Y	0.0
Z	0.18	Z	0.0

VolumeView Registration

15/11/2022 14:13:28 Scan Time: 18/10/2022 14:05:40

Treatment: 1:3672 Plan Date: 08/11/2022 19:10:07 Plan Description: MAMA 12Q

File Help

Coronal **ga jp** Sagittal **Registration for Clipbox** Image

Correction reference point = center of structure

Slice 133 of 270

Slice 132 of 270

Transverse **Reference** **Protocol**

Registration: Clipbox
Correction from: Clipbox

Registration (Clipbox) Method: Grey value (T)

Position Error

Translation (cm)		Rotation (deg)	
X	-0.34	X	0.0
Y	0.09	Y	0.0
Z	0.18	Z	0.0

VolumeView Registration

15/11/2022 14:13:28 Scan Time: 18/10/2022 14:05:40

Select registration algorithm for clipbox

TOLERANCIAS

PRECISE TABLE

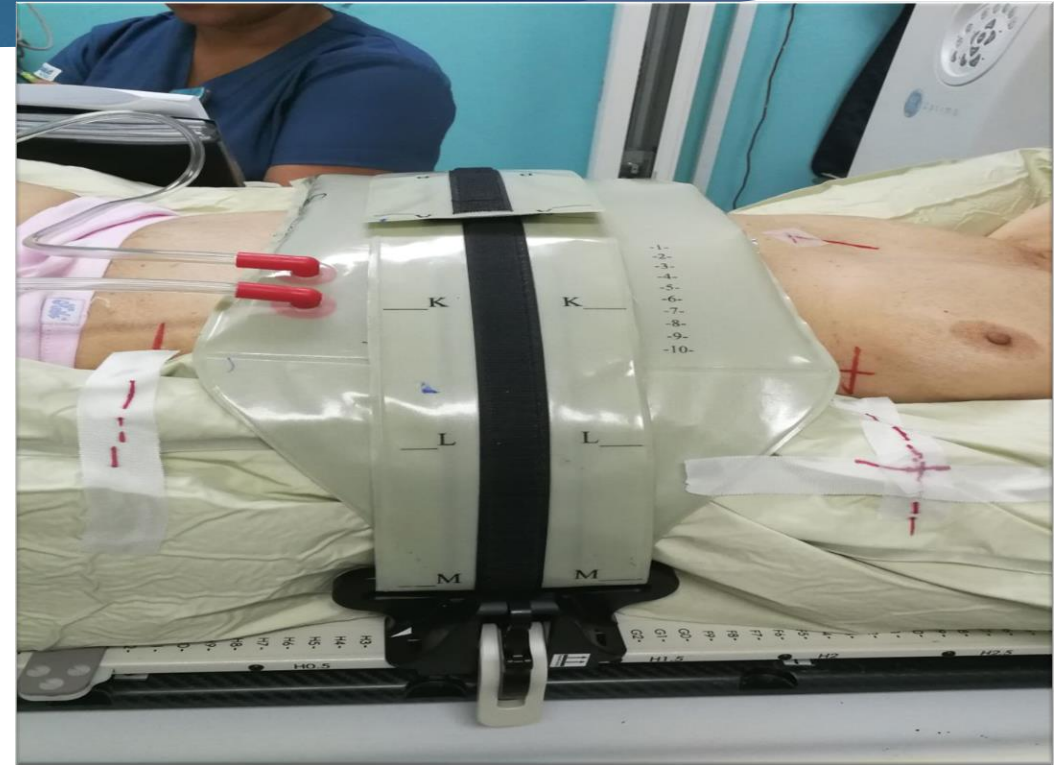
TRASLACIONAL	ROTACIONAL
< 5mm	2.5°

NIVELES DE ACCIÓN

FRACCION	X	Y	Z
4	0.1	0.2	-0.1
5	-0.1	0.1	0

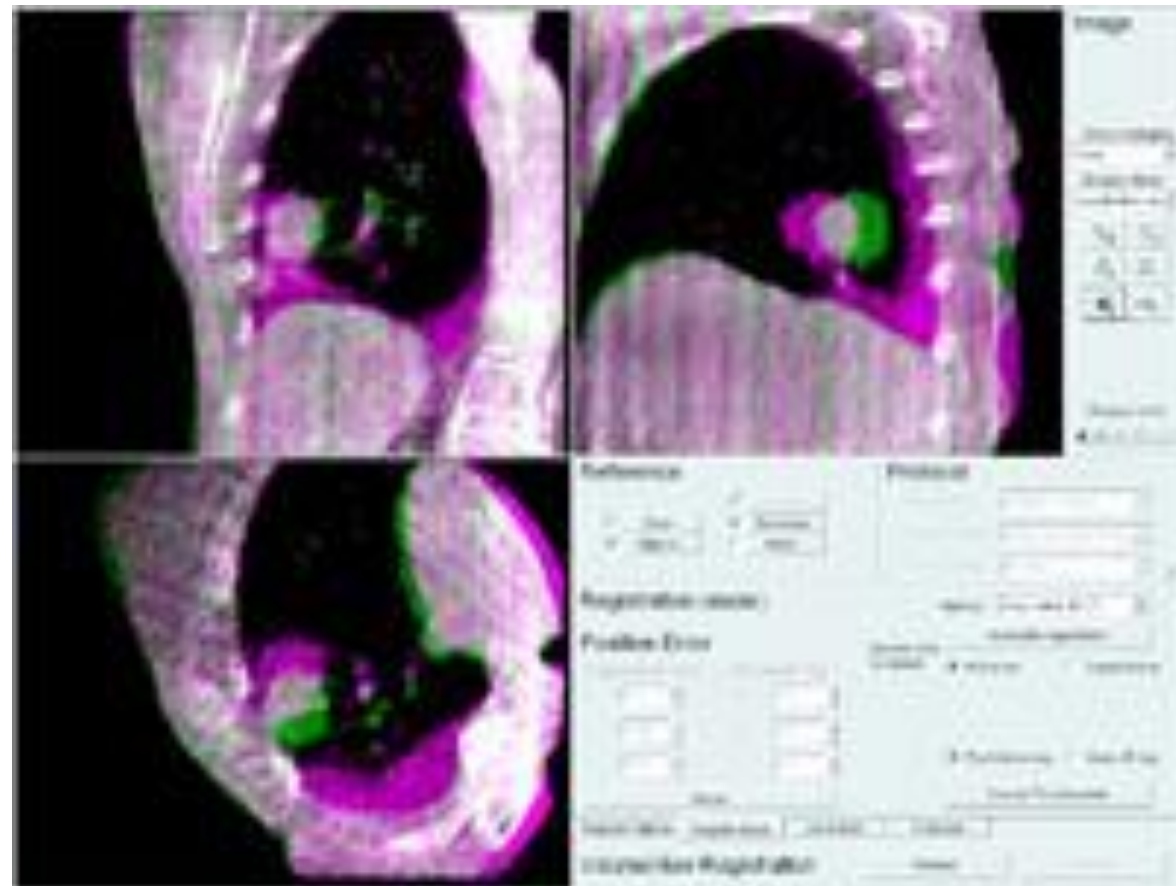
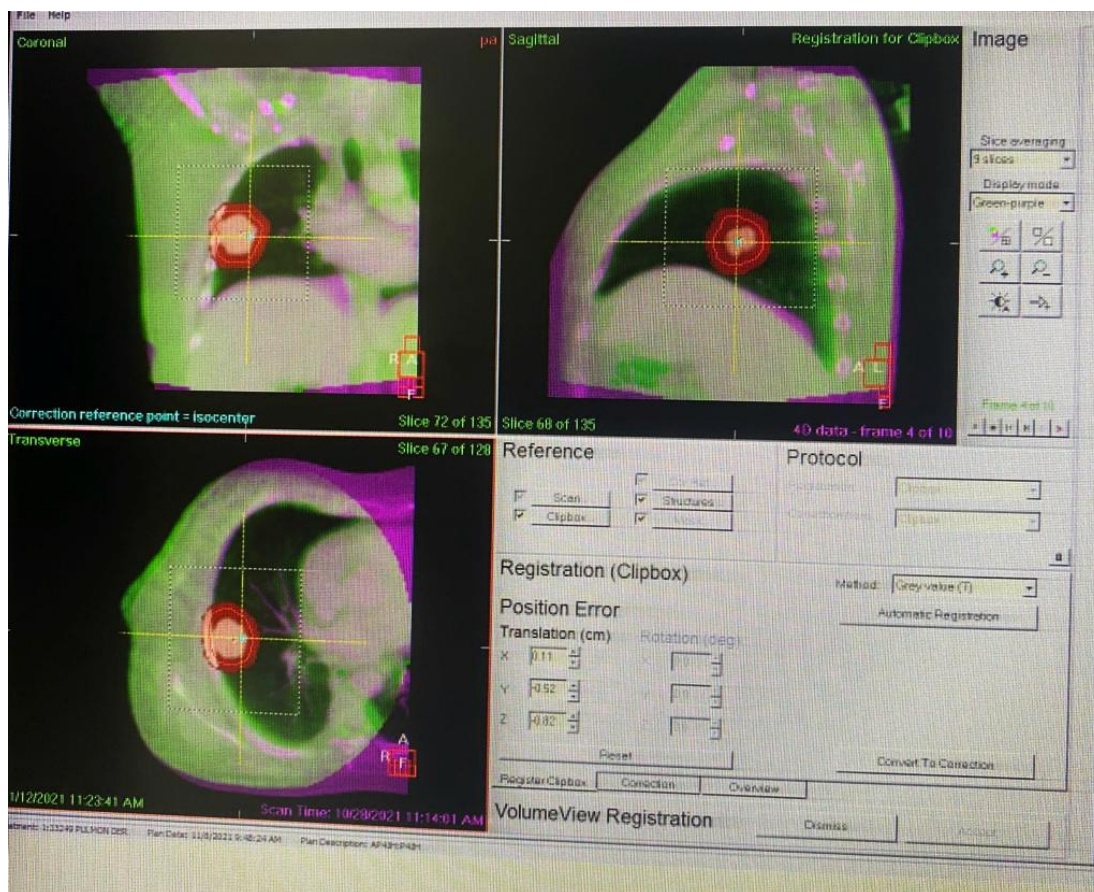


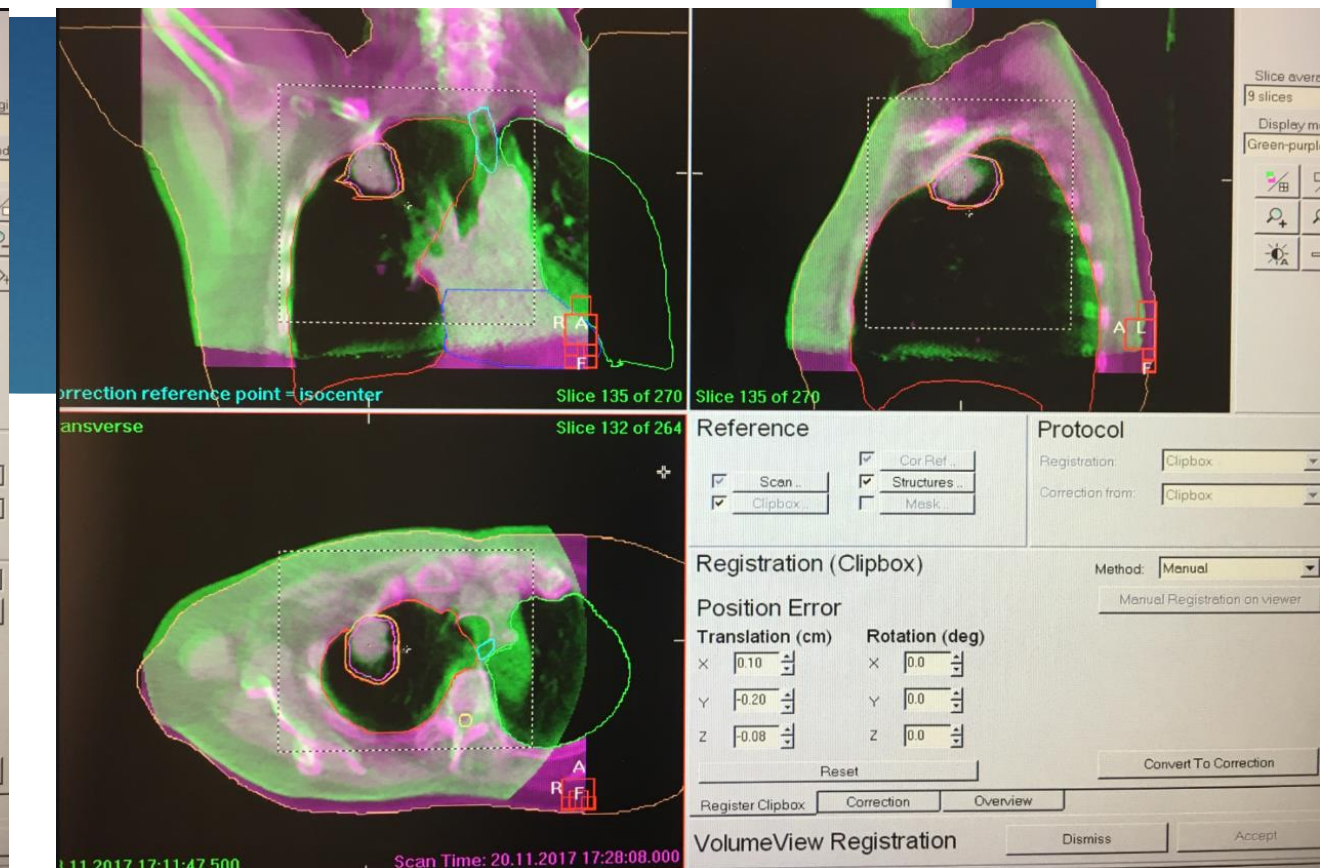
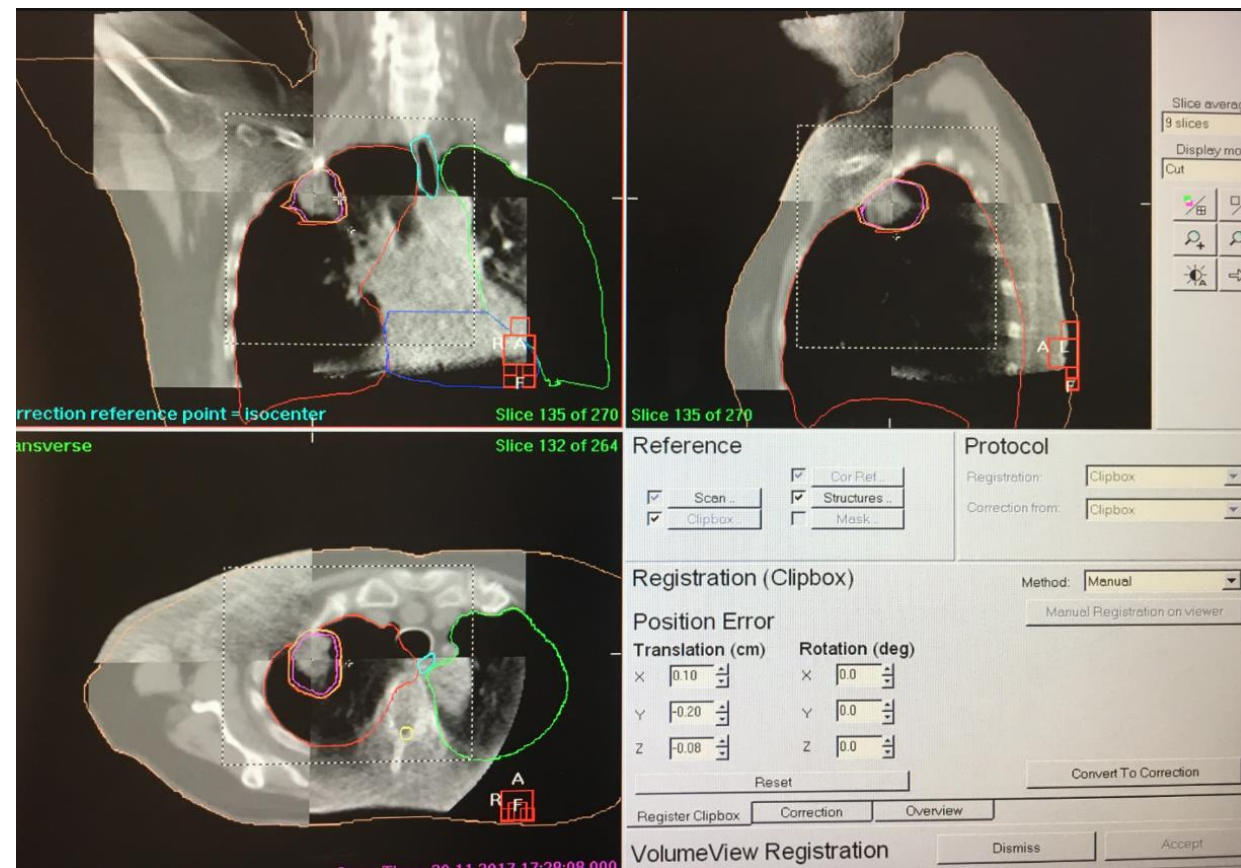
SBRT



CLIPBOX + MASK:

- El clipbox incluye parte osea cercana.
- Mask es igual al PTV
- Correccion en Simmetry para ver movimiento del PTV.





TOLERANCIAS

PRECISE TABLE

TRASLACIONAL	ROTACIONAL
<3mm	2°

RECOMENDACIONES

Se deben realizar protocolos acorde a la población de cada institución.

Deben manejarse listas de verificación que eviten errores groseros antes del inicio de la RTE.

Los errores aleatorios deben minimizarse con atención cuidadosa a la inmovilización y la preparación del paciente.

Los errores sistematico y aleatorios deben determinarse para todas las técnicas en uso y todos los sitios anatómicos tratados. Esta data debe ser usada para dar el margen correcto del CTV al PTV.



Nunca pares, nunca te conformes hasta que lo bueno sea mejor y lo mejor EXCELENTE



**Muchas
gracias**