

Interstitial Brachytherapy in Cervix- Advancements

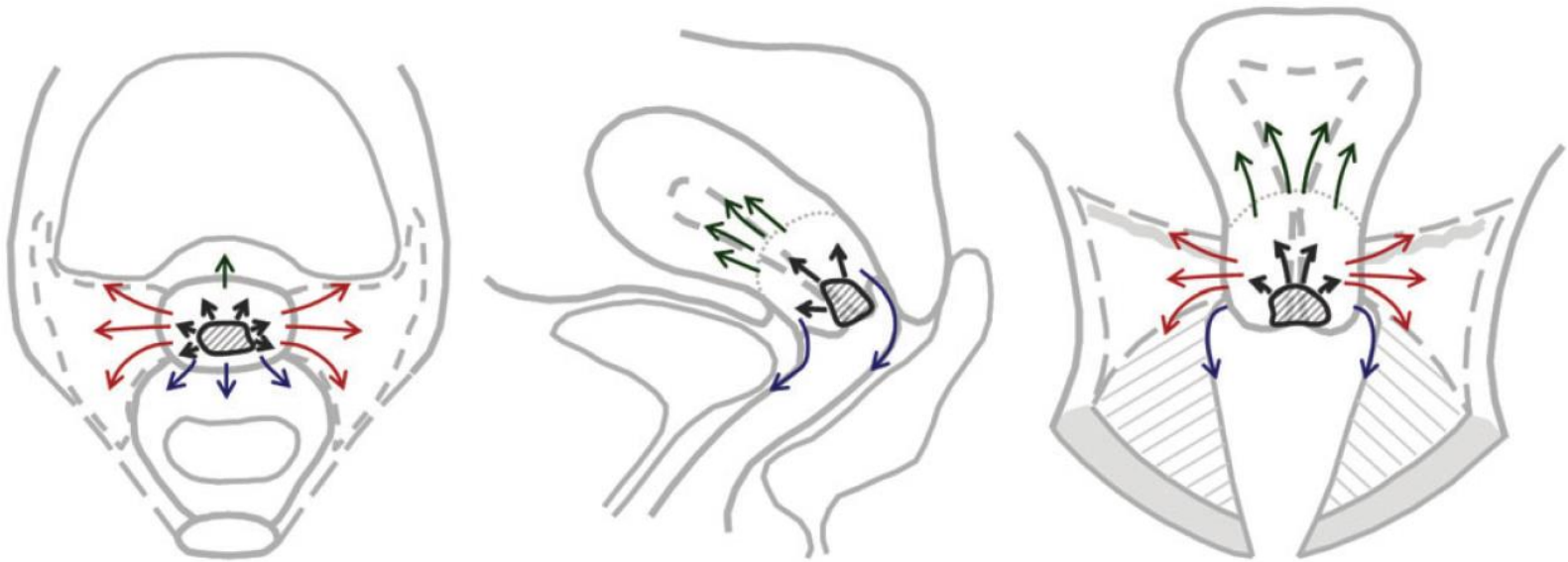
Dr Manur Gururajachar Janaki
Prof and Head
Ramaiah Medical College
Bengaluru



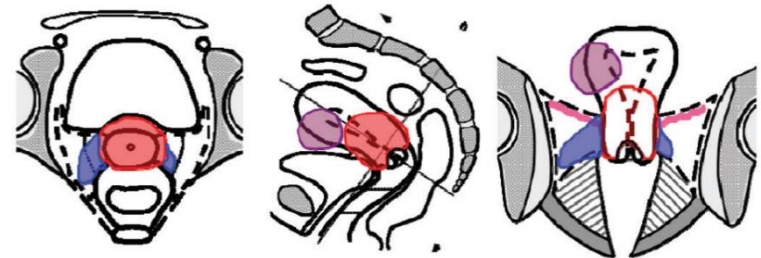
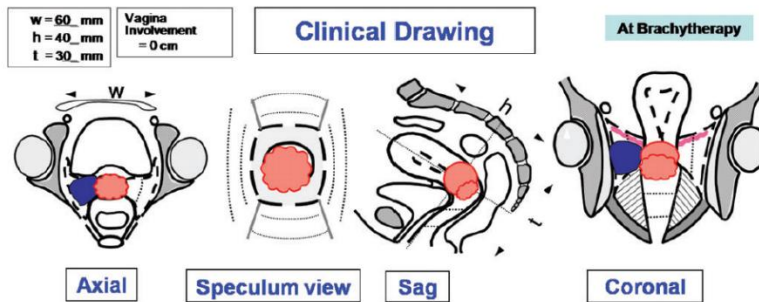
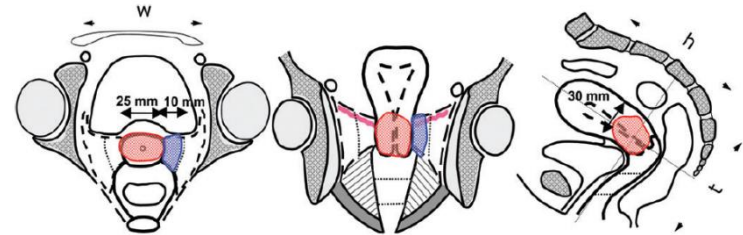
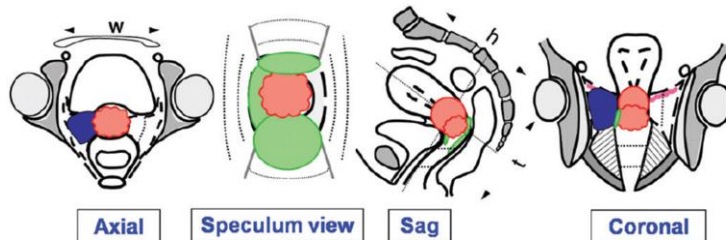
Objectives of the teaching session....

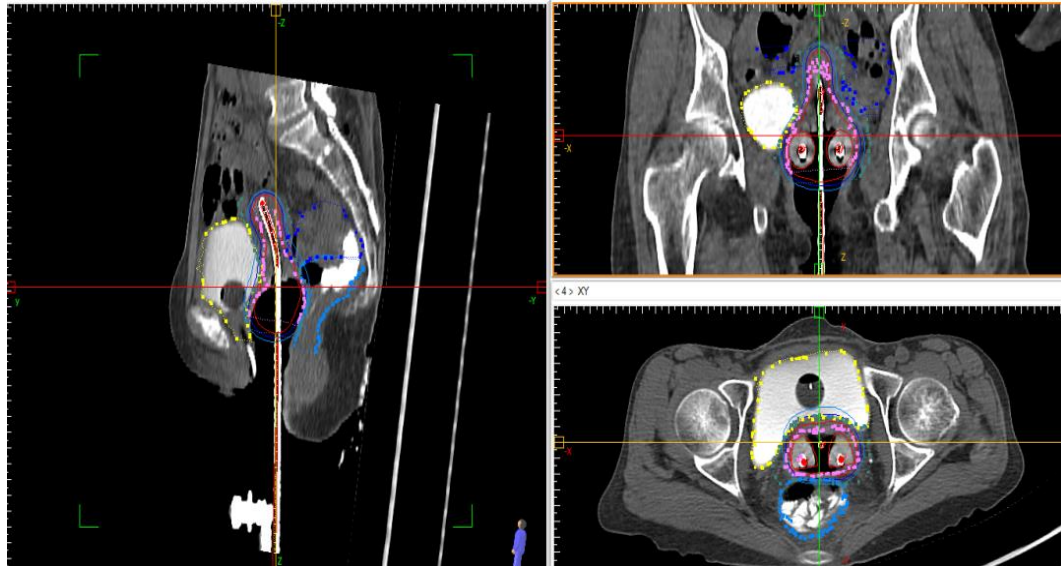
- To understand the concept of ISBT
- To list the Indications of ISBT
- To identify different applicators available
- To know the procedure, plan evaluation
- To understand the benefits with ISBT

Spread of cervical cancer



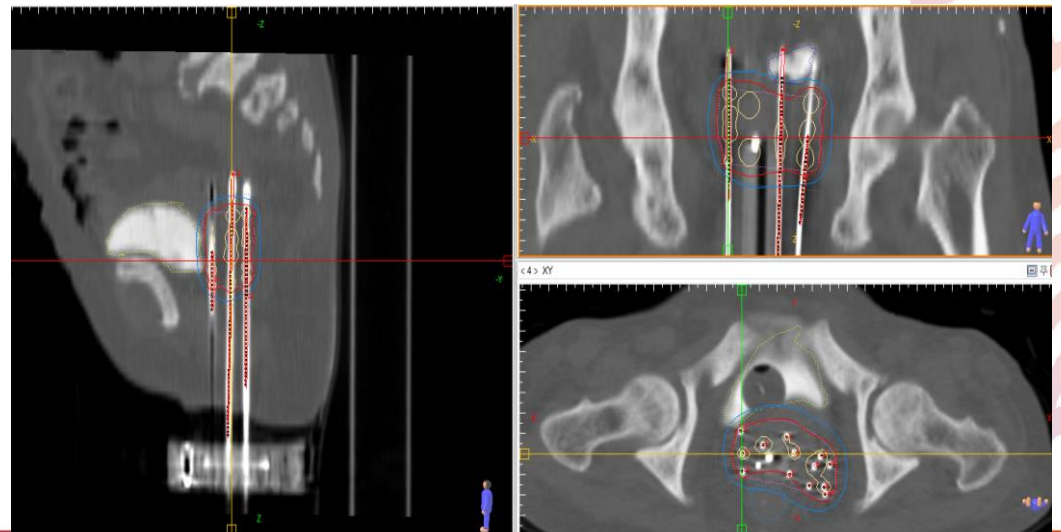
Very important.....





Intracavitary
Brachytherapy

Interstitial
Brachytherapy



Indications for ISBT

- Ca Cervix IIB (advanced) & beyond
 - If Partial Response
 - Bulky Parametrial Disease at Brachy
 - Post Op + Parametrium Positive
- Anatomic variations
 - Distorted Geometry (obliterated fornices)
 - Narrow Vagina
 - OS not identifiable/negotiable
- Vault Recurrence
- Reirradiation

Different applicators available



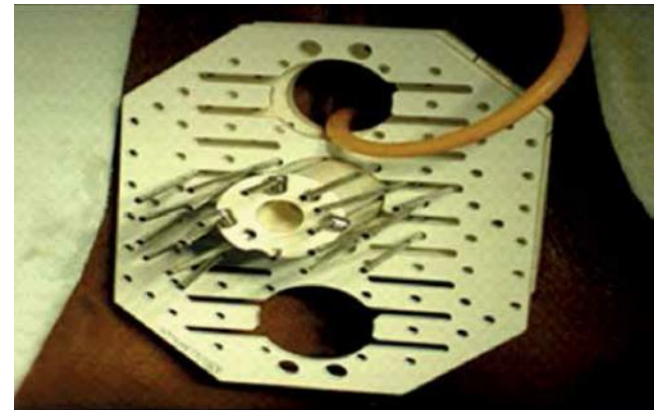


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- Syed-Neblette



MUPIT (Martinez Universal Perineal Interstitial Template)



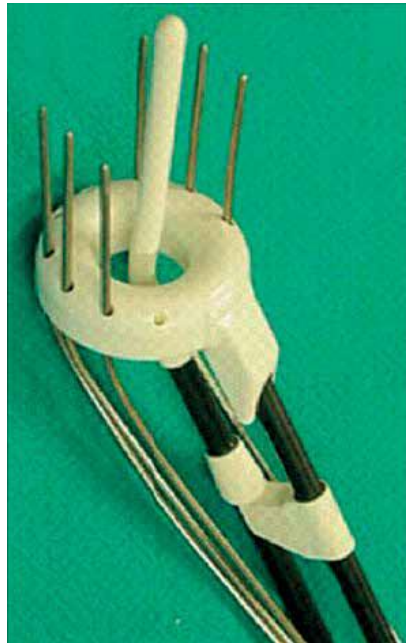


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Vaginal mould
brachy..impression
after EBRT



Vienna
Ring..type I
and II



Tandem ovoids
with freehand
needles



Tulip applicators....add on with...

Fletcher



Henschke



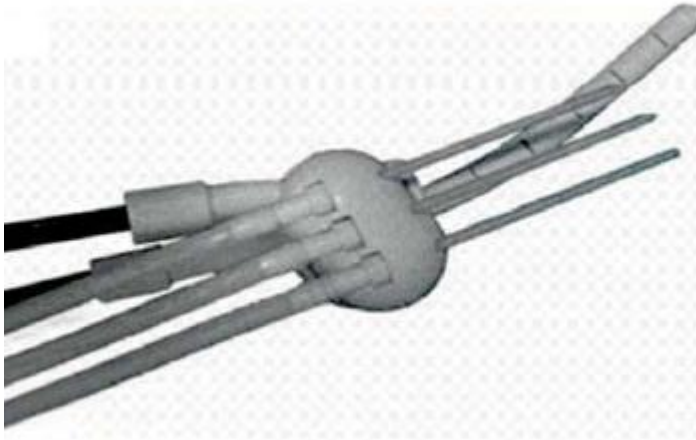
Ring



Tulip flowers



Utrecht applicator



Venezia applicator



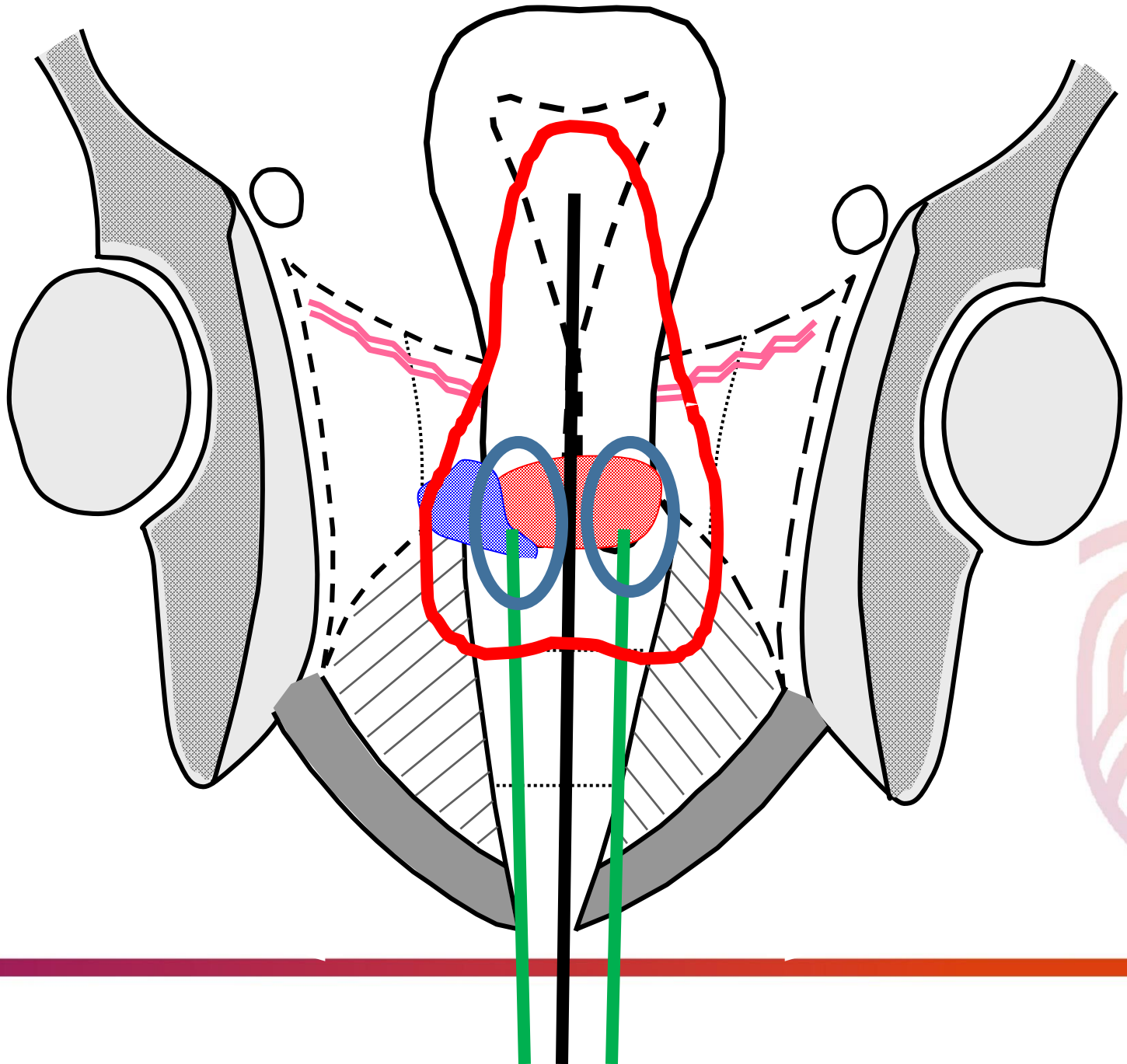


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Selection of the applicator system



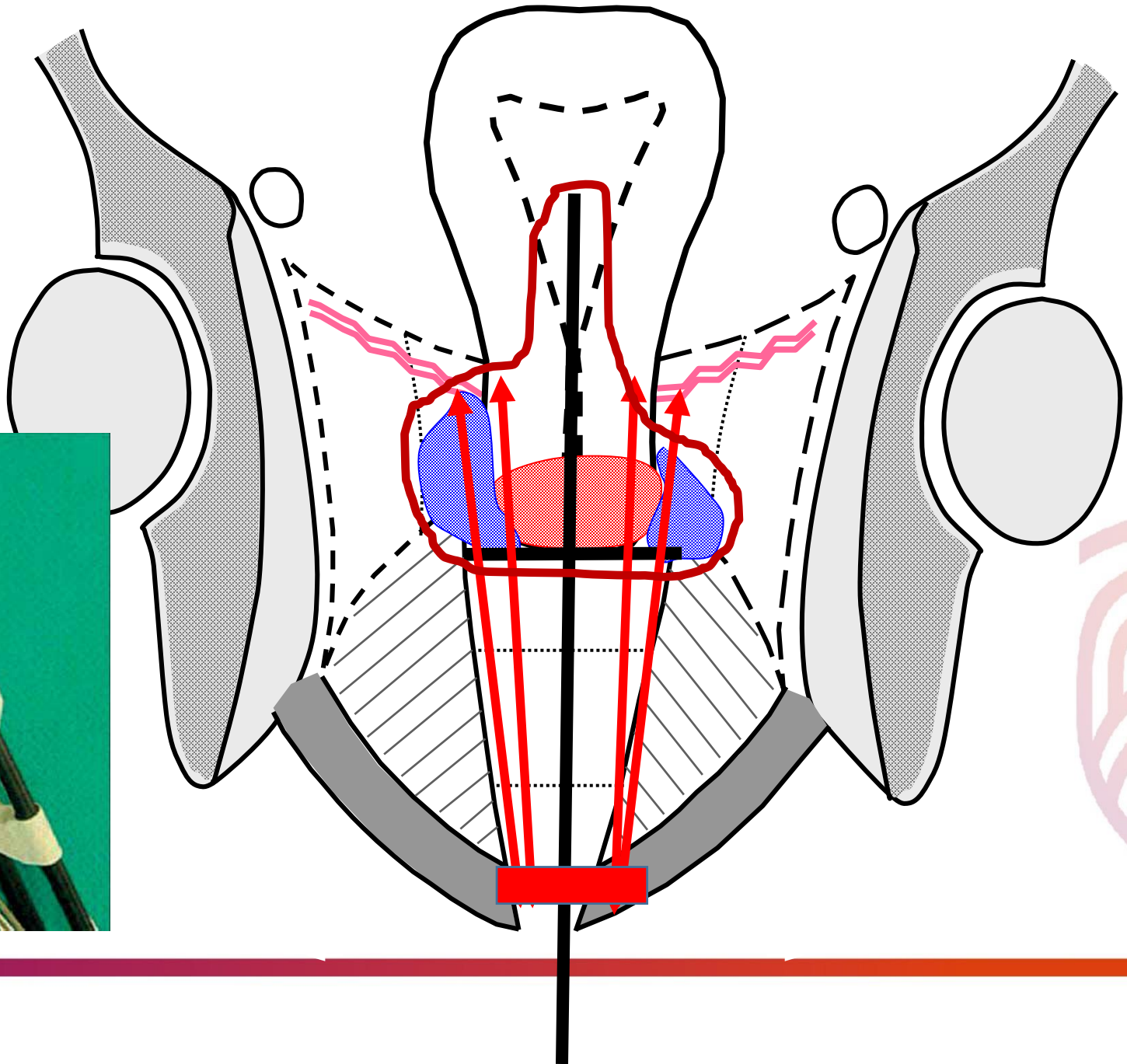
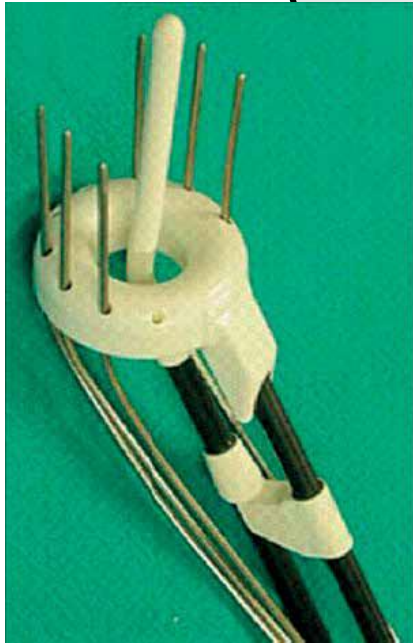
Medial third
parametrial
involvement





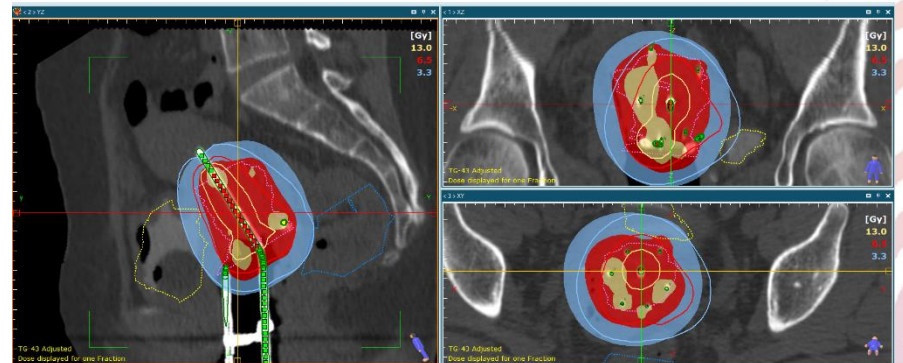
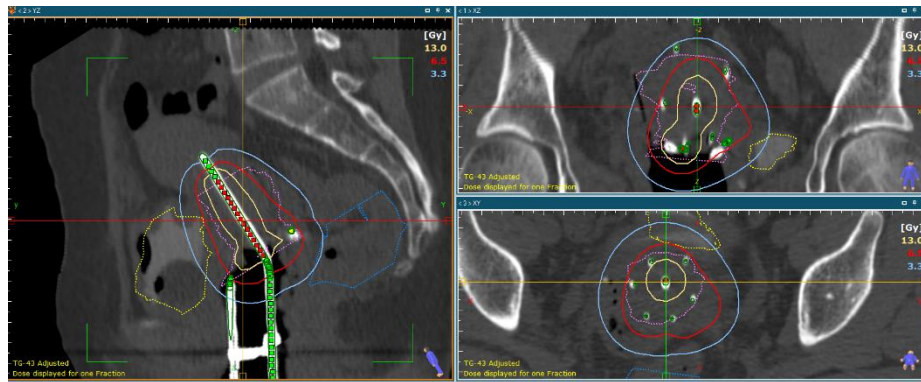
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Tandem ring
with straight
needles





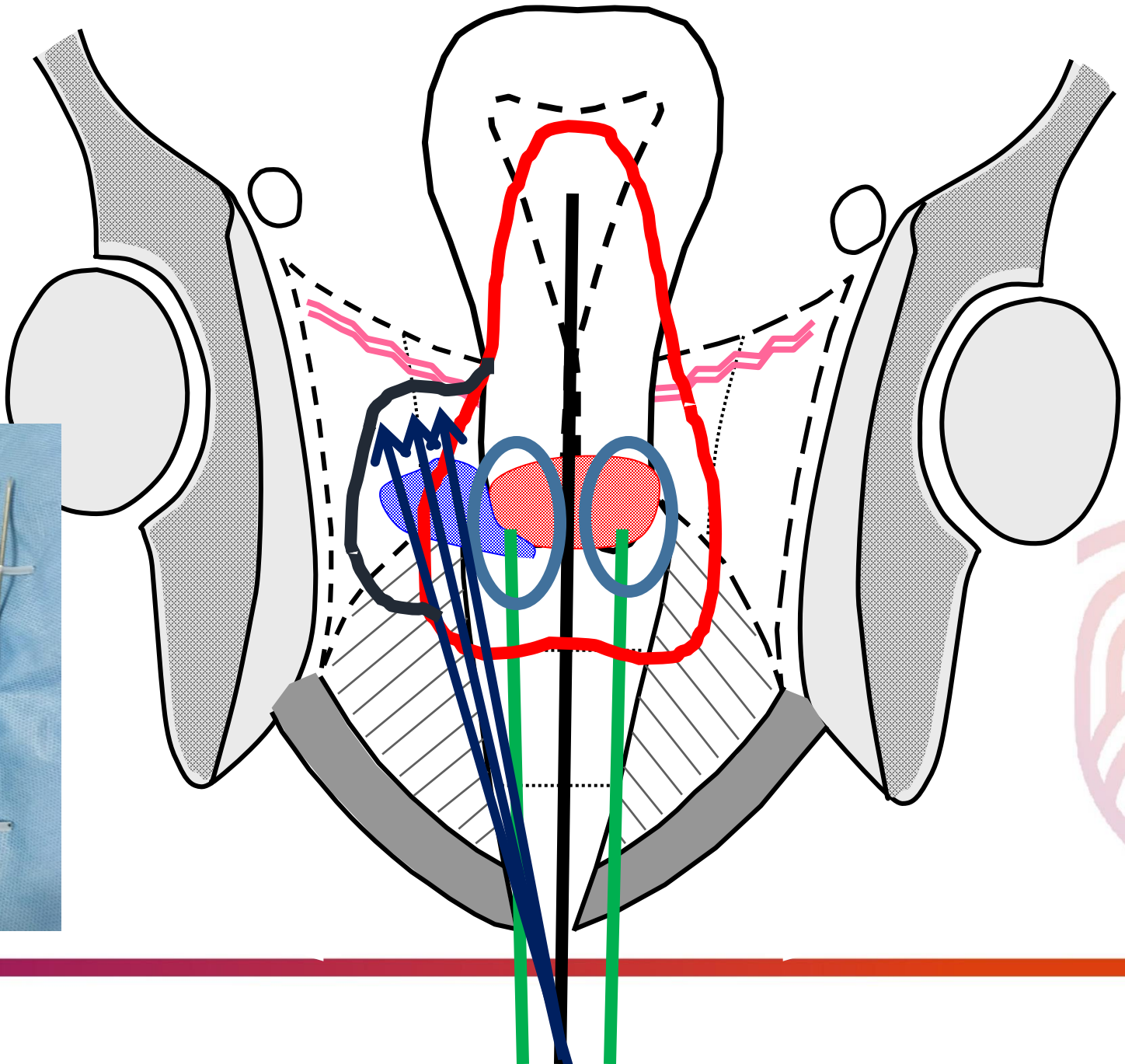
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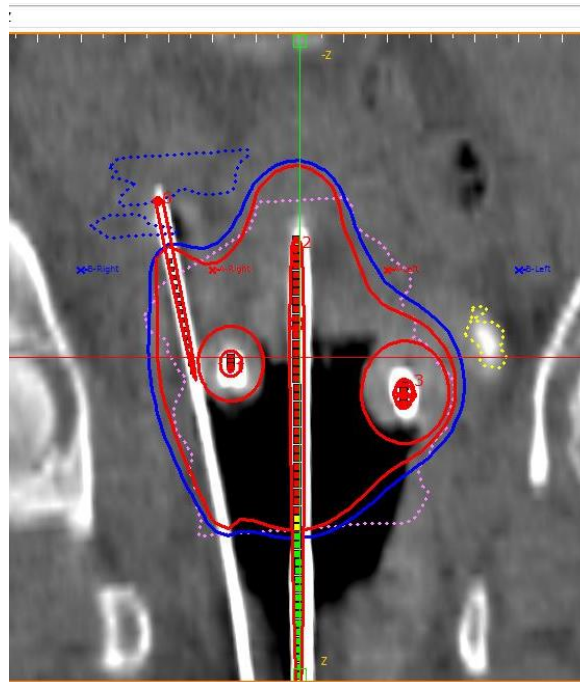


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Tandem
ovoids with
freehand



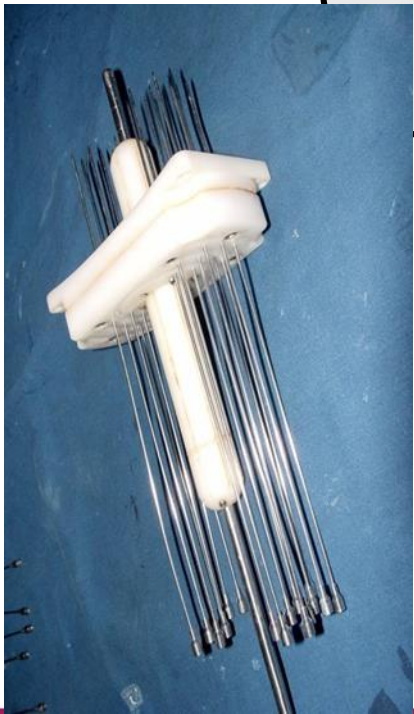
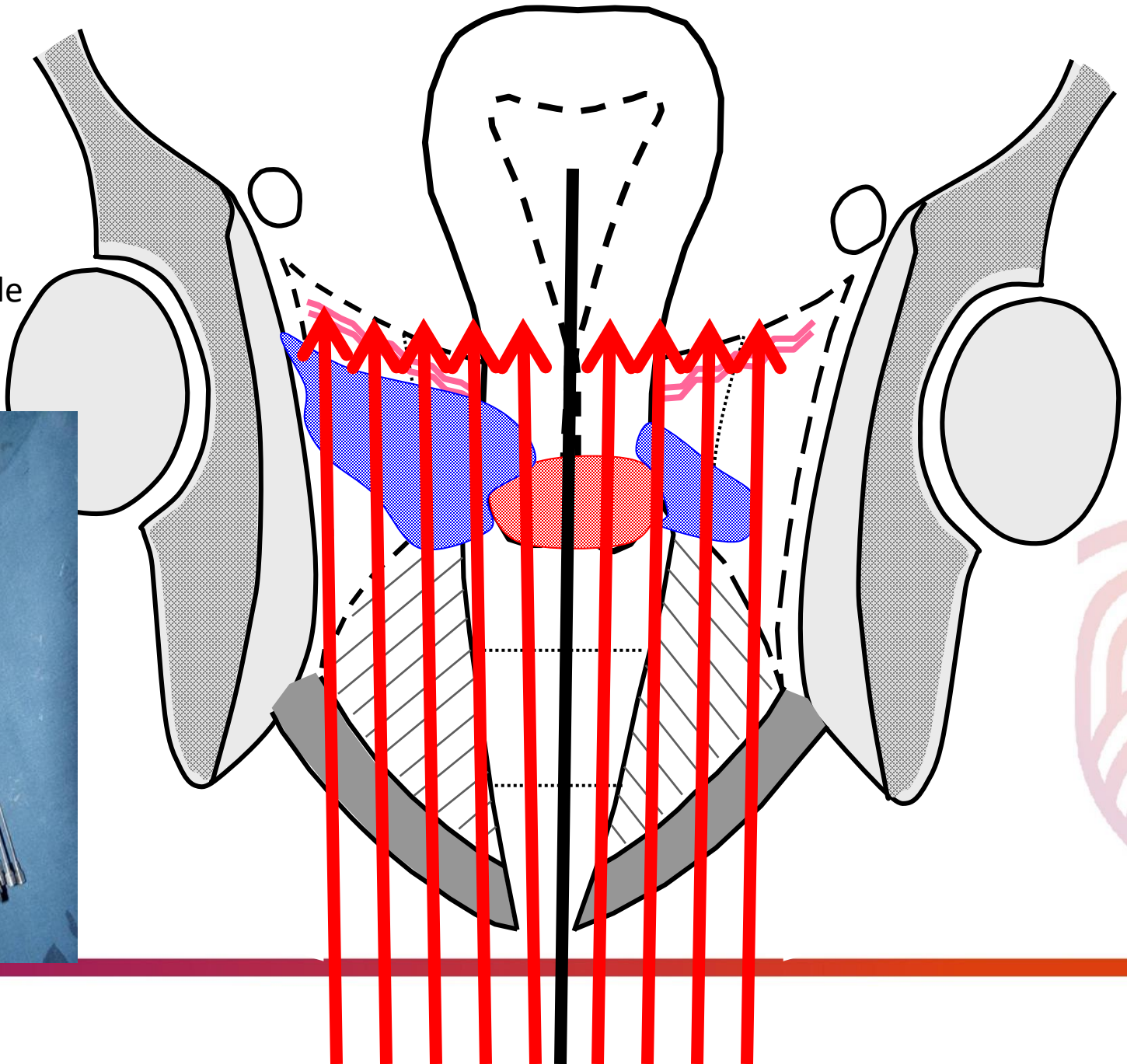
Freehand ISBT



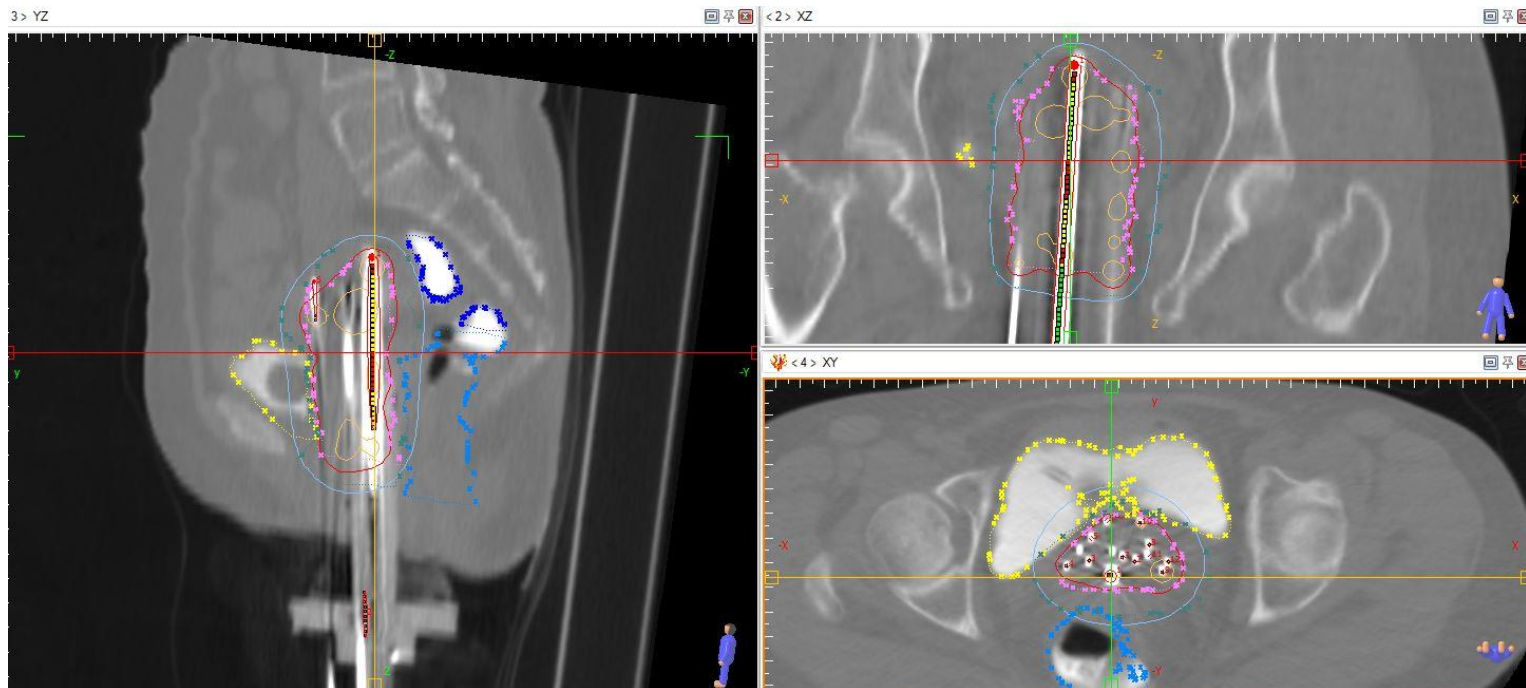


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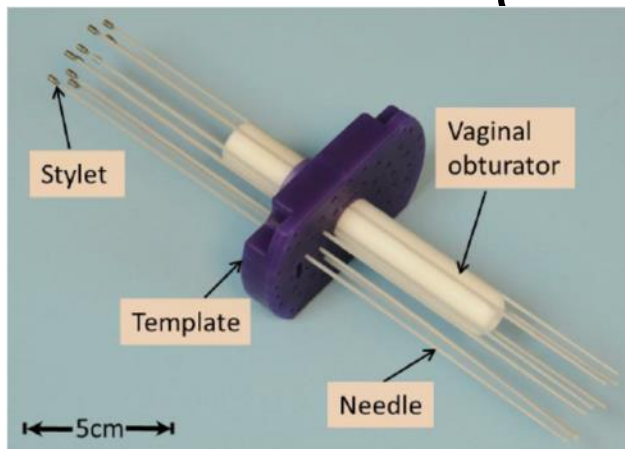
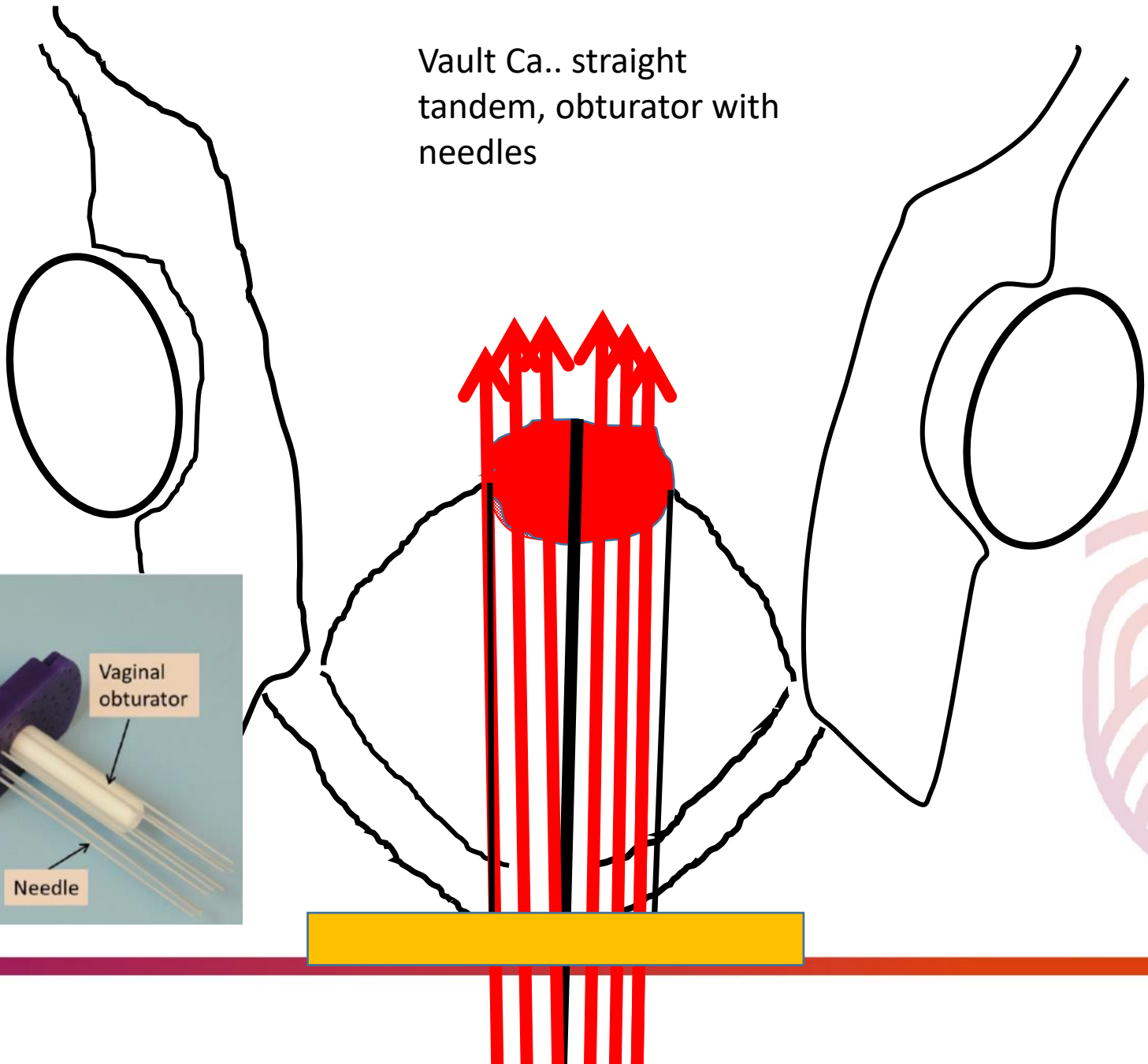
Both para, upto
LPW on one side



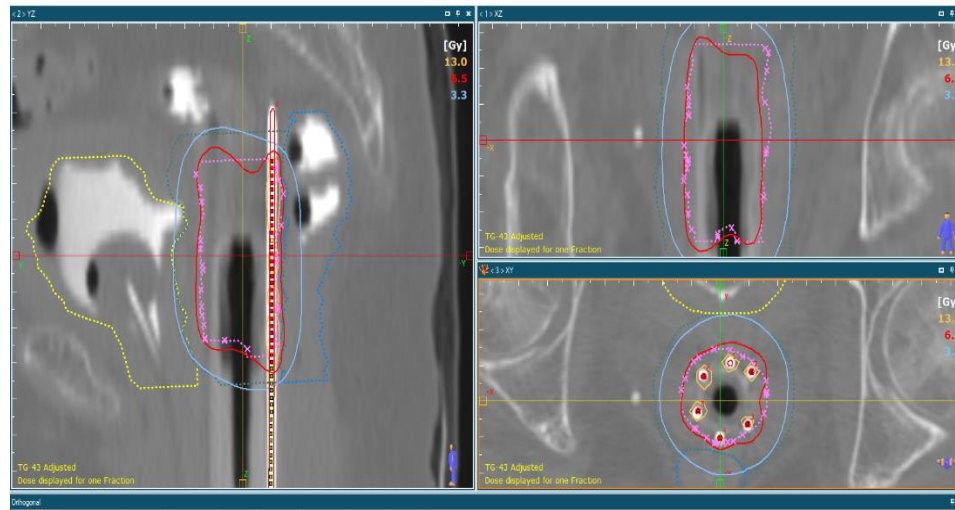
Para involvement on both sides..



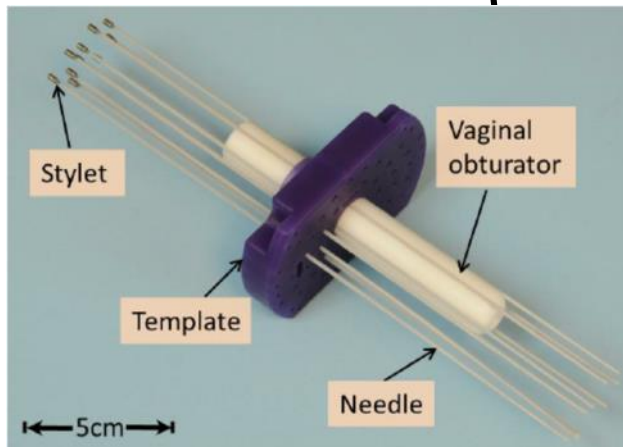
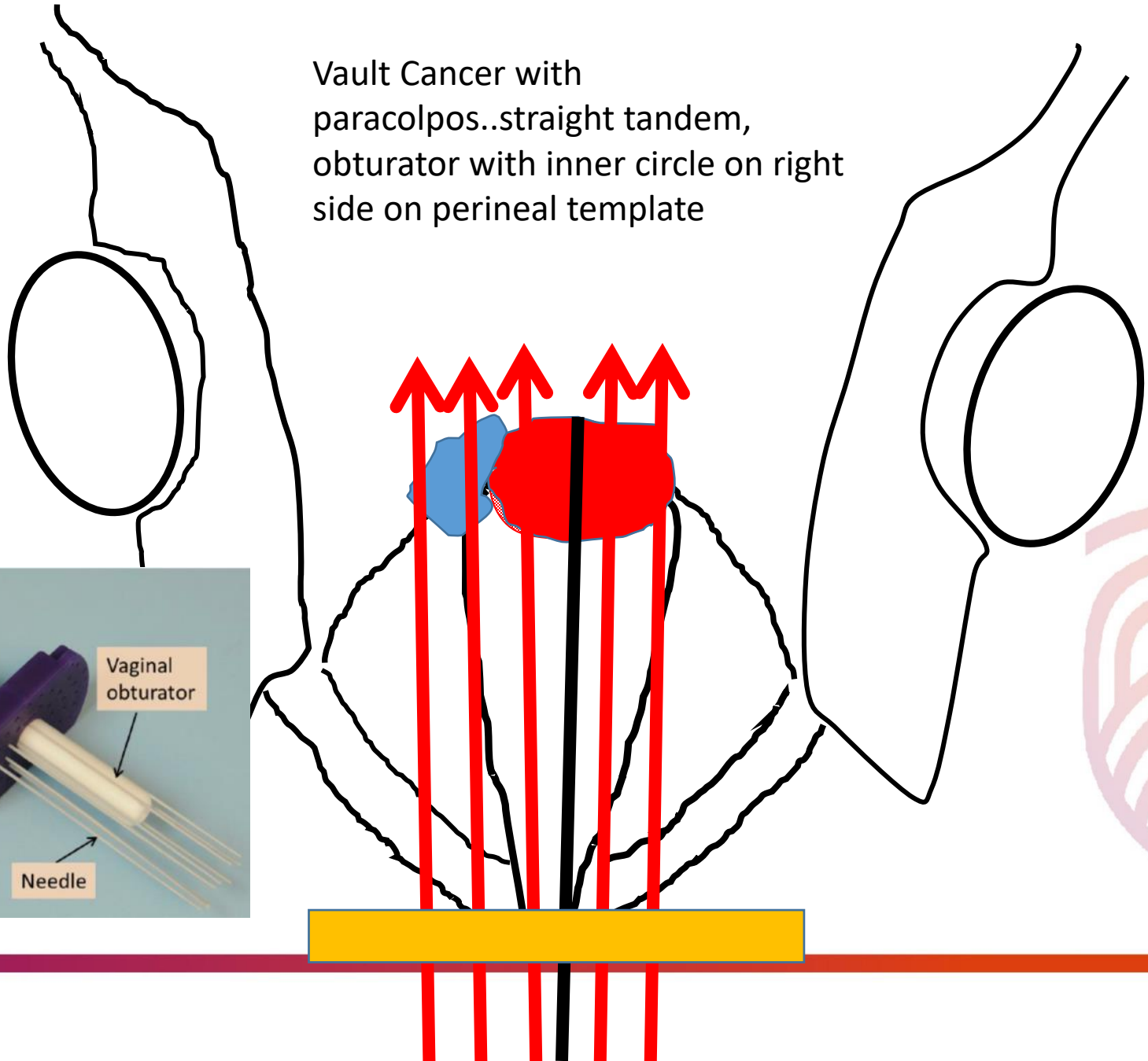
Vault Ca.. straight
tandem, obturator with
needles

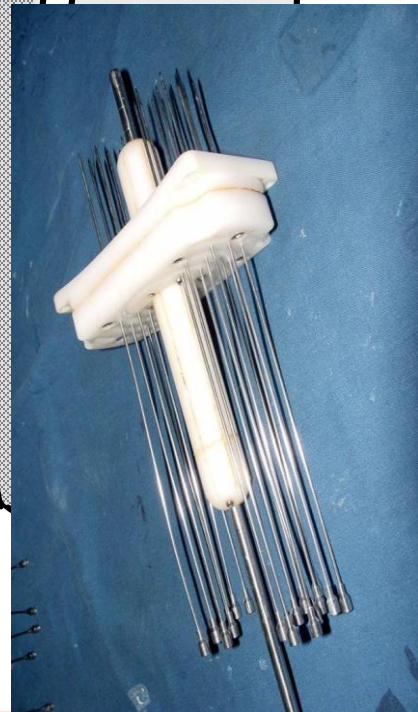
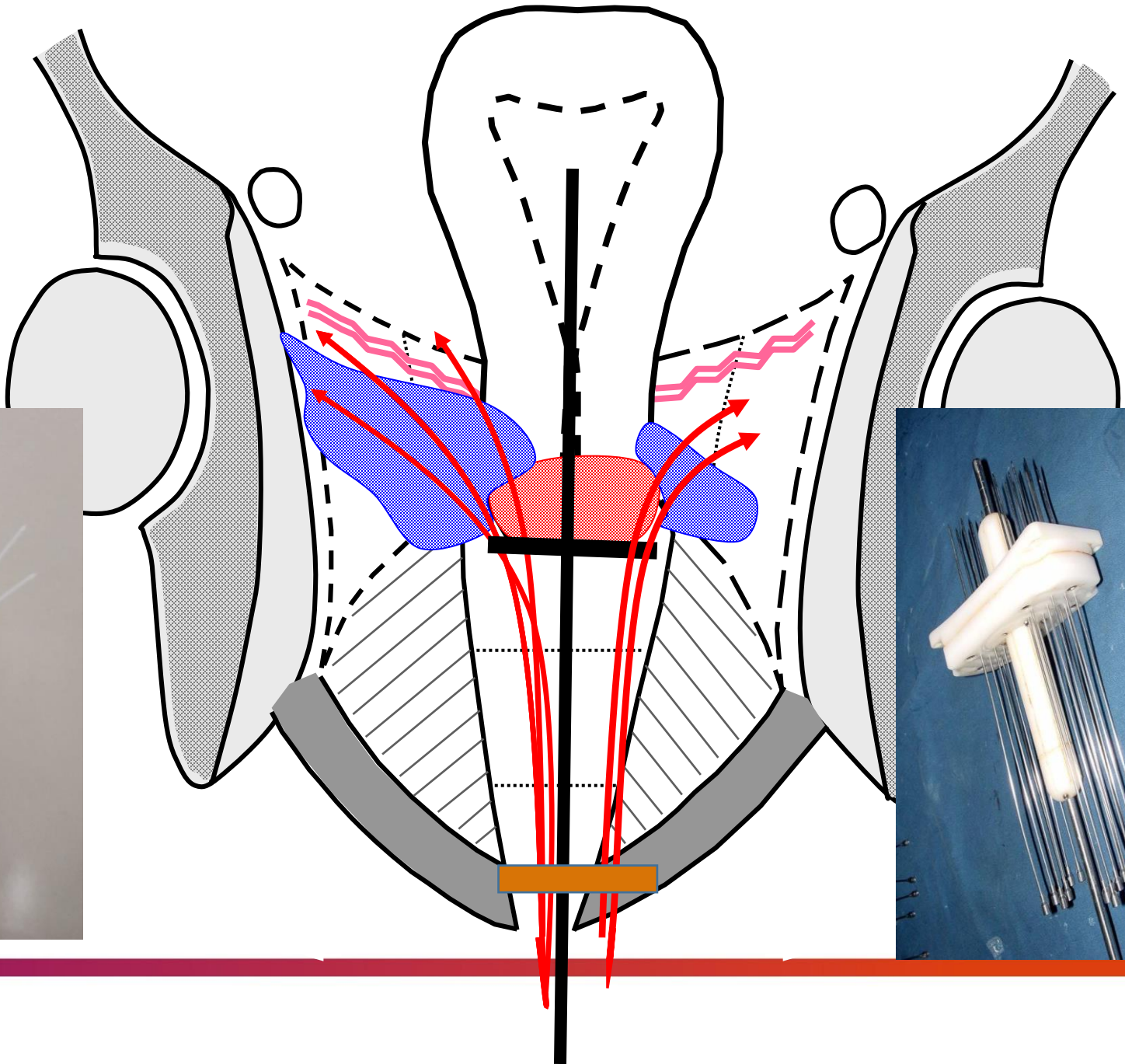


Postop/Vault Ca

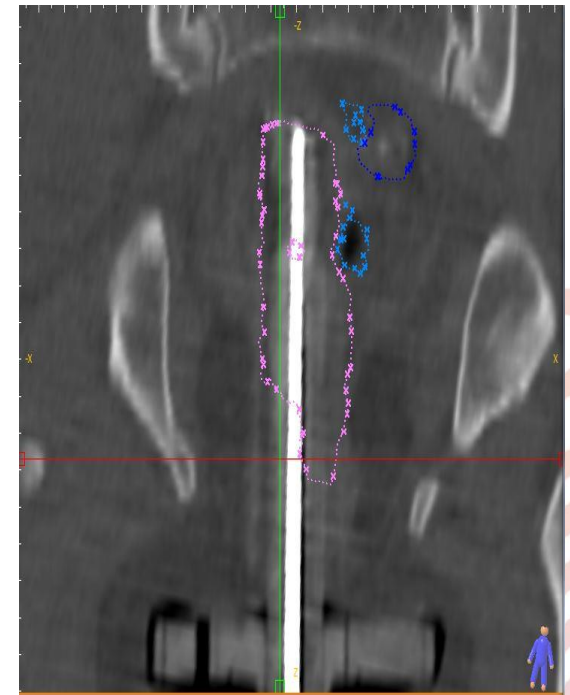
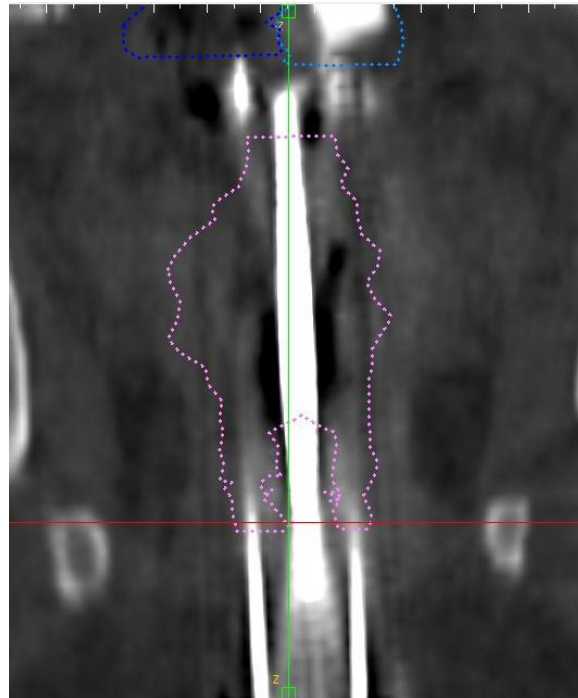
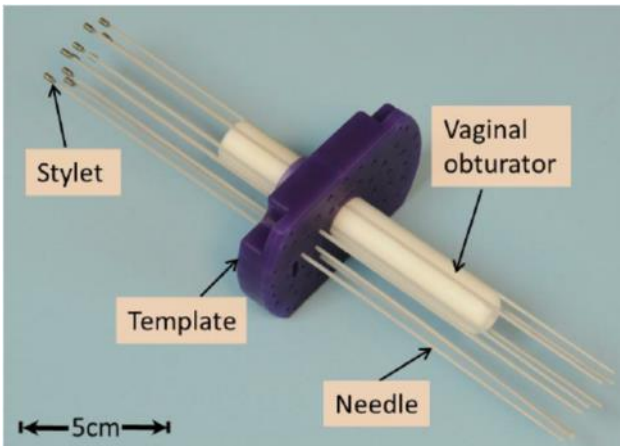


Vault Cancer with
paracolpos..straight tandem,
obturator with inner circle on right
side on perineal template

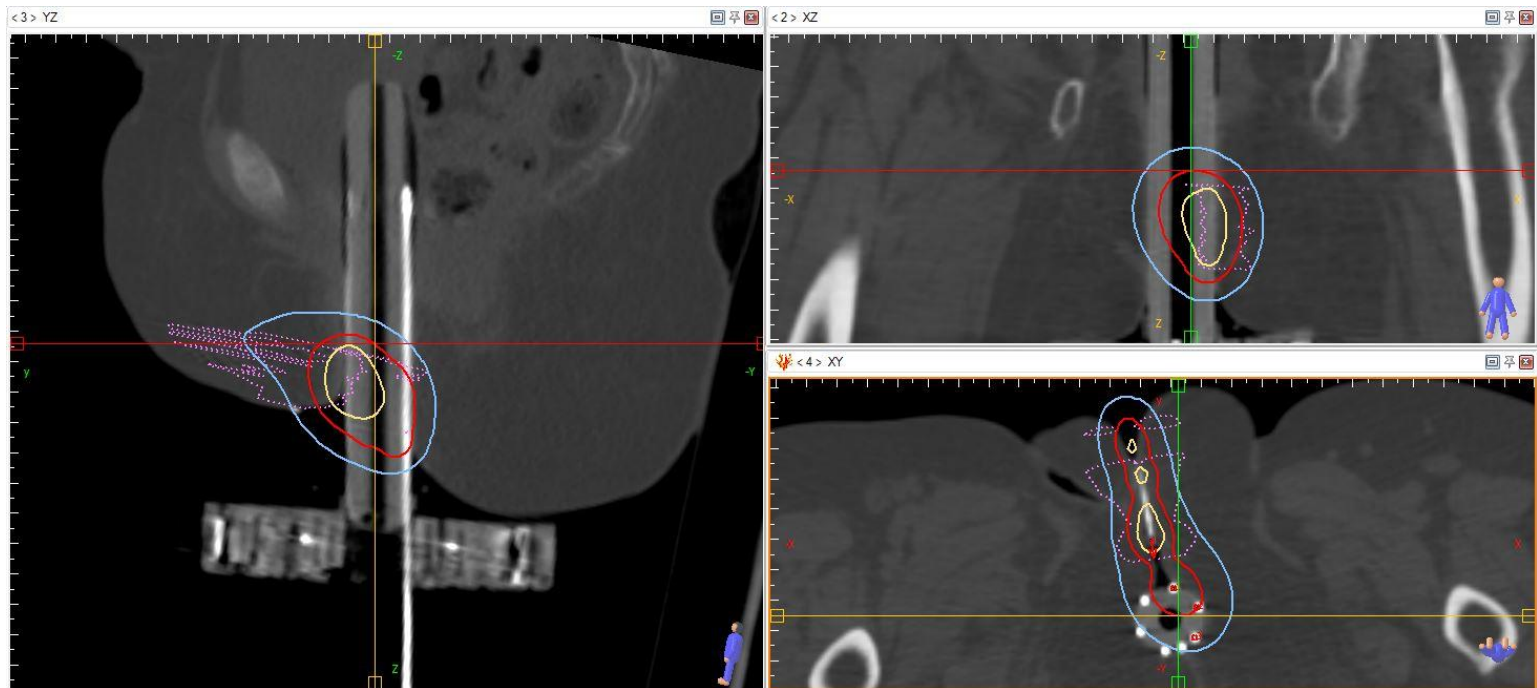




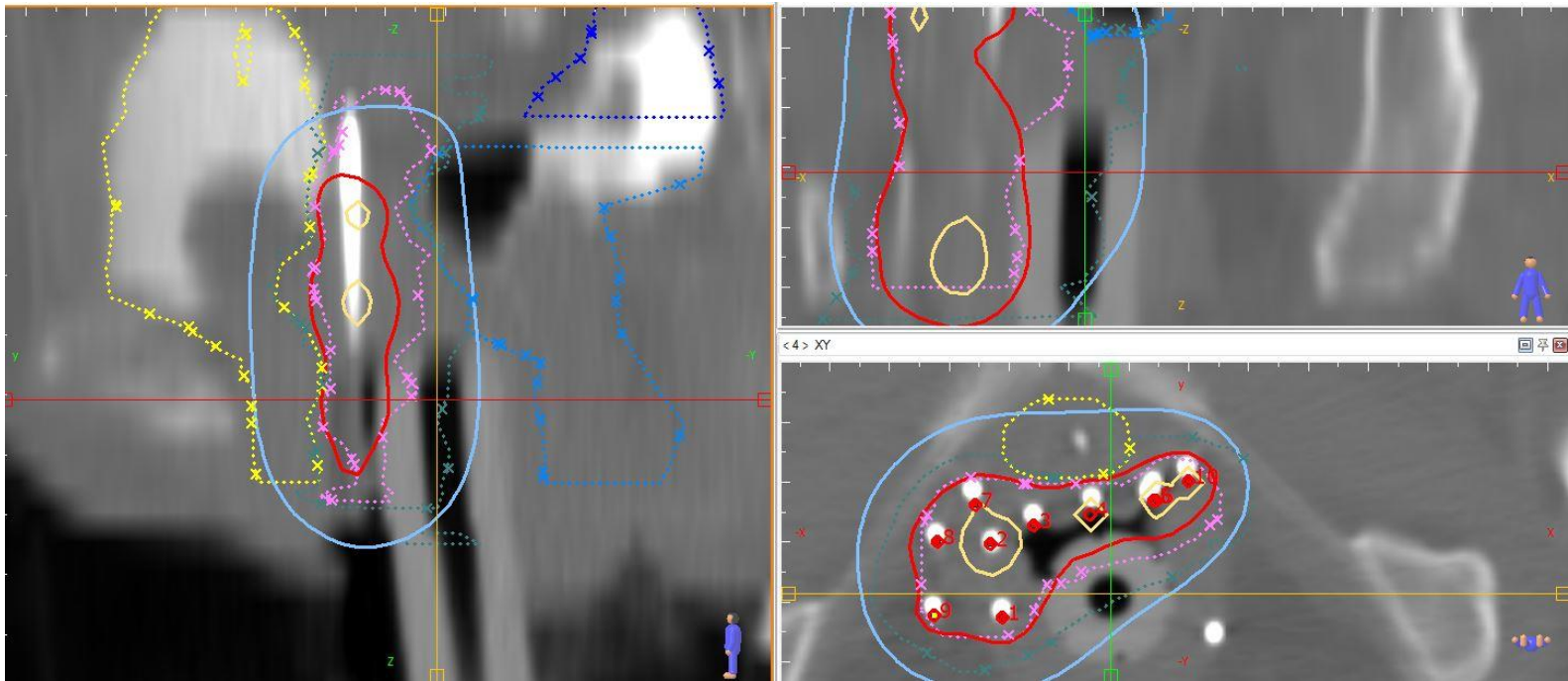
Tandem/obturator...selective vaginal involvement



Vulva....obturator with additional wires at introitus



Recurrence in vagina

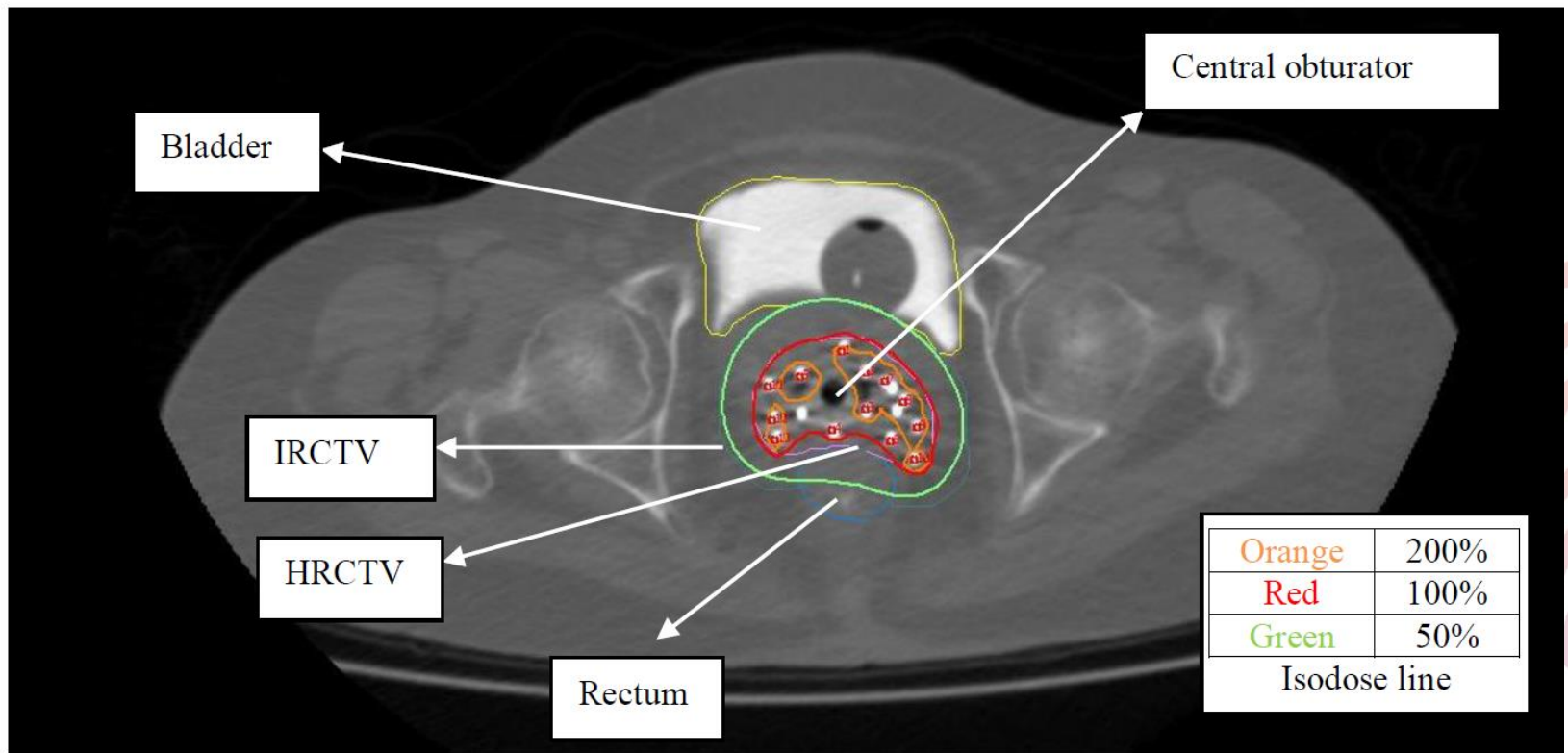


Plan evaluation...

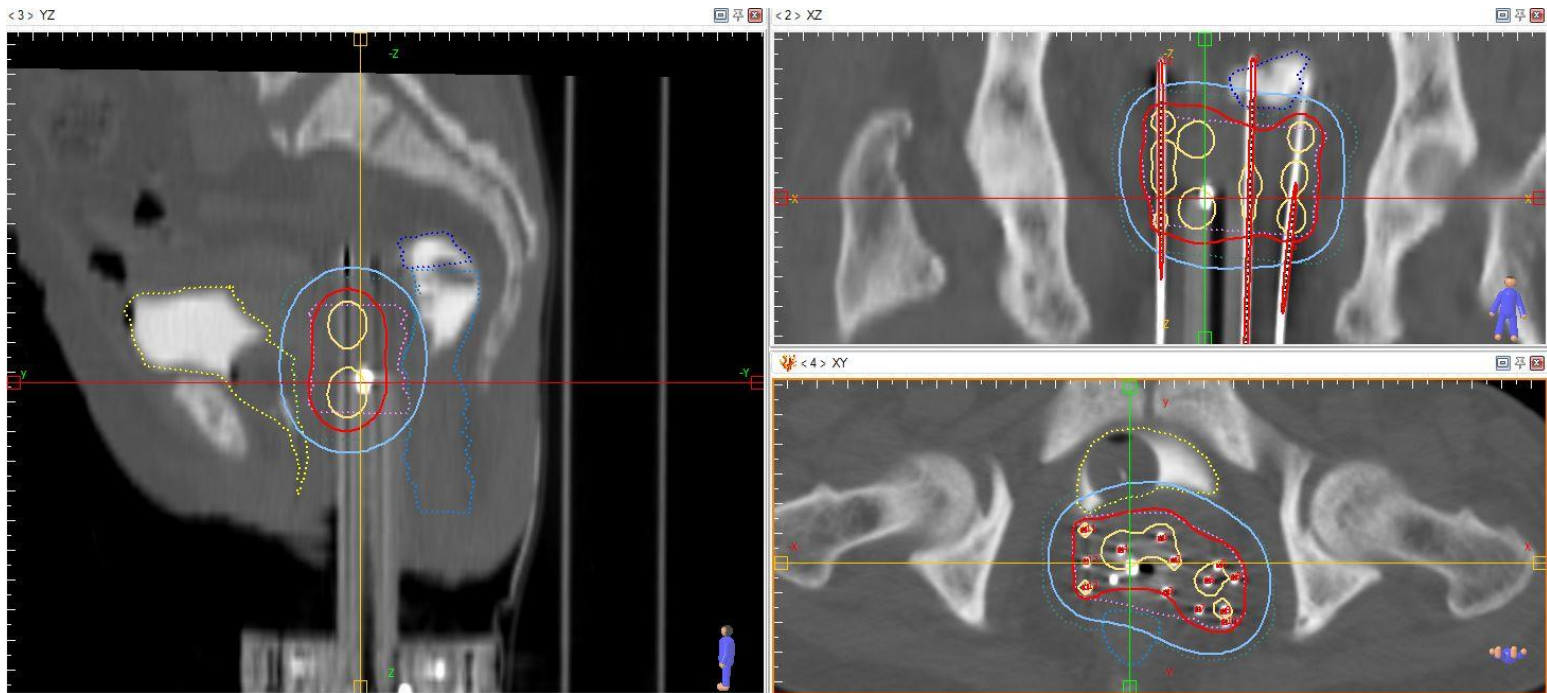




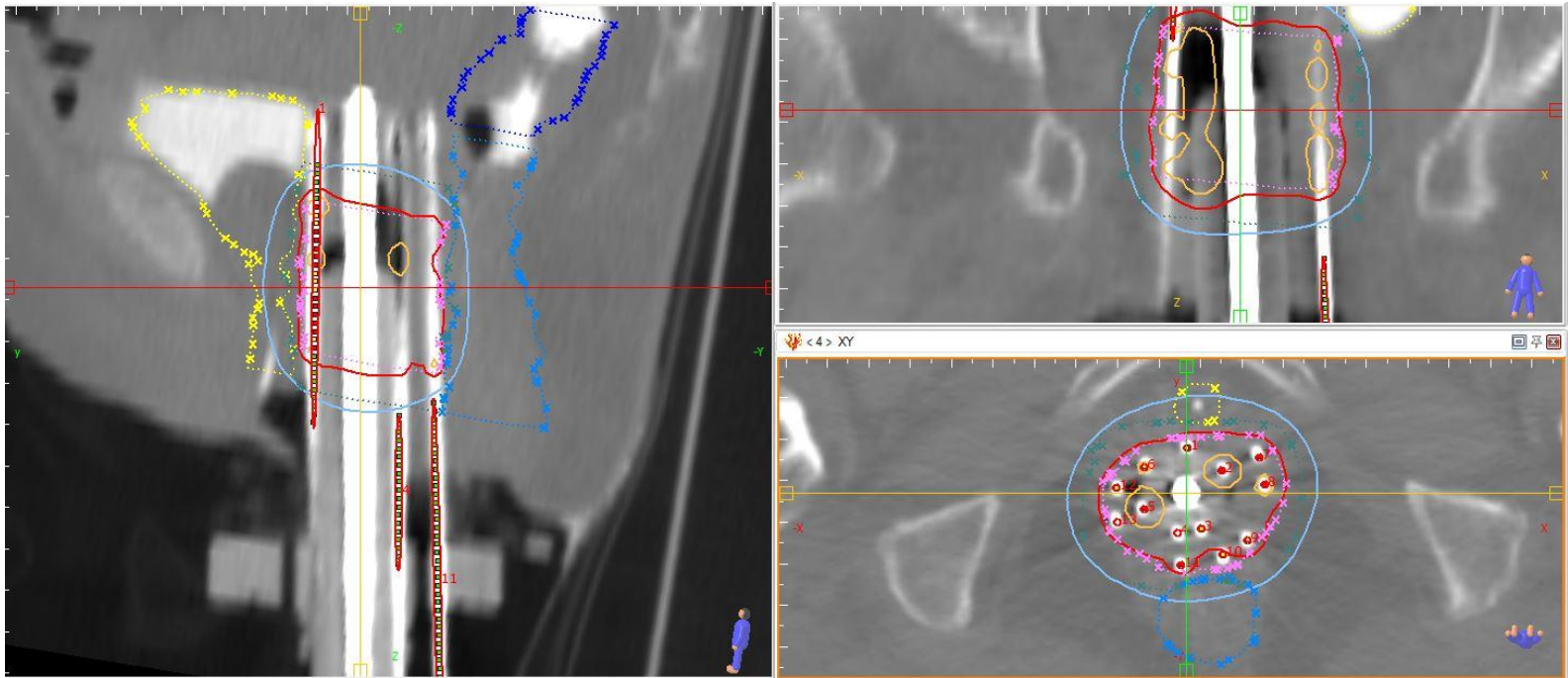
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Hyperdose sleeve...should not touch
each other as much as possible



Rectum and Bladder evaluation..





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Prescription Dose Rx = 6.50 Gy

Plan Quality Indices

	TR WITHOUT NEEDLES	TR WITH NEEDLES
:1 (V100)	79.0 %	97.1 %
:2	55.3 %	52.7 %
COIN	0.436	0.512

Total Dose Volume for 6.50 Gray

TR WITHOUT NEEDLES	TR WITH NEEDLES
64.58 cm ³	83.52 cm ³

hrctv

Total Volume = 45.4 cm³, 4692 Control Points

	TR WITHOUT NEEDLES		TR WITH NEEDLES	
V90	38.3 cm ³	84.5 Vol%	44.8 cm ³	98.7 Vol%
V100	35.8 cm ³	79.0 Vol%	44.1 cm ³	97.1 Vol%
V150	24.4 cm ³	53.9 Vol%	34.2 cm ³	75.4 Vol%
V200	14.3 cm ³	31.5 Vol%	17.3 cm ³	38.1 Vol%
D90	5.1 Gy	78.9 %Rx	8.1 Gy	124.5 %Rx
D98	3.9 Gy	60.3 %Rx	6.2 Gy	95.1 %Rx
D100	2.7 Gy	41.9 %Rx	4.4 Gy	68.3 %Rx

bladder

Reference Volume = 97.9 cm³, 4746 Control Points

	TR WITHOUT NEEDLES		TR WITH NEEDLES	
D2cm ³	4.0 Gy	61.6 %Rx	4.0 Gy	61.7 %Rx

rectum

Reference Volume = 46.9 cm³, 4976 Control Points

	TR WITHOUT NEEDLES		TR WITH NEEDLES	
D2cm ³	2.7 Gy	41.6 %Rx	2.7 Gy	41.8 %Rx



ISBT Execution



Original paper

Interstitial high-dose-rate brachytherapy using cobalt-60 source for cervical cancer: dosimetric and clinical outcomes from a single institute

Mohan Kumar, MD, Revathy Thangaraj, MSc, Ram Charith Alva, MD, Kirthi Koushik, MD, Arul Panni, MD, Manur Gururajachar Janaki, MD

Ramaiah Medical College, Bengaluru, India

- Our data..2020,JCB,(70 pts)
 - LC ..87% at 2 yrs
 - D90 ..70-86 Gy
 - D2cc rectum...64 Gy
 - D2 cc sigmoid ..48 Gy
 - D2cc bladder ..70 Gy



Results for ISBT

Table 4. Comparison of EQD₂ and local control

Study (no. of patients)	Total dose EBRT + BT	D ₉₀ CTV _{HR} [Gy]	Bladder D _{2cm³} [Gy]	Rectum D _{2cm³} [Gy]	Local control
Murakami <i>et al.</i> [3] (209)	50 Gy + 6 Gy × 4 fractions	74.2	71.0	67.5	87.8% at 3 years
Kannan <i>et al.</i> [5] (47)	45 Gy + 3.75-5 Gy × 5 fractions	70-79	70.83	65.79	61% at 2 years
Lee <i>et al.</i> [20] (68)	45 Gy + 3.9 Gy × 7 fractions	73.6	67.1	64.6	86% at 2 years
Souza <i>et al.</i> [24] (47)	45 Gy + 4.6 × 4 fractions or 9.2 Gy × 2	70.2	61.6	63.2	68% at 3 years
Villalba <i>et al.</i> [25]	50 Gy + 4 Gy × 6 fractions				88% at 3 years
CT (34)		75.8	79.8	75.3	
MRI (25)		78.6	77.1	69.90	
Bailleux <i>et al.</i> [27]	46 Gy + 7 Gy × 3 fractions				86.8% at 2 years
CT (16)		82.9	76.8	66.4	
MRI (17)		84.8	74.5	64.3	
Present study (70)	45 Gy + 6.5 Gy × 4 fractions	77	70	64	87.14% at 2 years

EQD₂ – equivalent dose in 2 Gy, CT – computed tomography, MRI – magnetic resonance imaging, CTV_{HR} – high-risk clinical target volume, D_{2cm³} – dose received by 2 cm³ volume, D₉₀ – dose received by 90% of the volume



To Summarise....

- ISBT effectively covers all types of targets for cervical cancer
 - Delivers minimal dose to rectum,bladder,Sigmoid
 - Applicators have seen tremendous improvement over the years and are patient friendly
 - Computerised plans permit quick planning and evaluation
 - All the above have resulted in better therapeutic ratio
-
- We at our place do train doctors for ISBT with cadaveric practice to overcome inhibition to do ISBT.

Objectives of the teaching session....

- To understand the concept of ISBT
- To list the Indications of ISBT
- To identify different applicators available
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- To understand the benefits with ISBT

Thank Youhappy learning.....

