

First Indian Experience with Shaped Beam Radiosurgery of Cranial and Spinal lesions On Novalis Tx with ExacTrac 6-D Robotic Couch

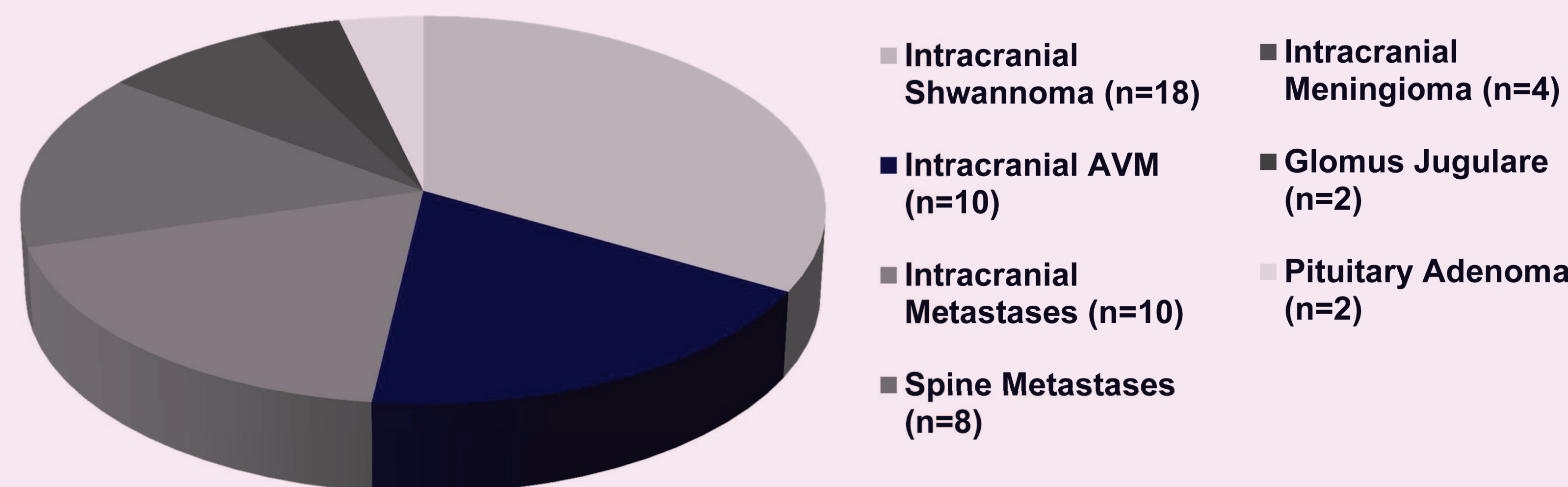
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Objective

To present the initial experience of Stereotactic Radiosurgery (SRS) of cranial and spinal lesions with Novalis Tx Linear Accelaerator using micromultileaves and Exac Trac image guidance system at Apollo Cancer Hospital, Hyderabad, India.

Patient population (54 lesions in 50 patients)



Patients were treated between May 2010 and Apr 2011

Stereotactic Immobilization



Volumetric Imaging

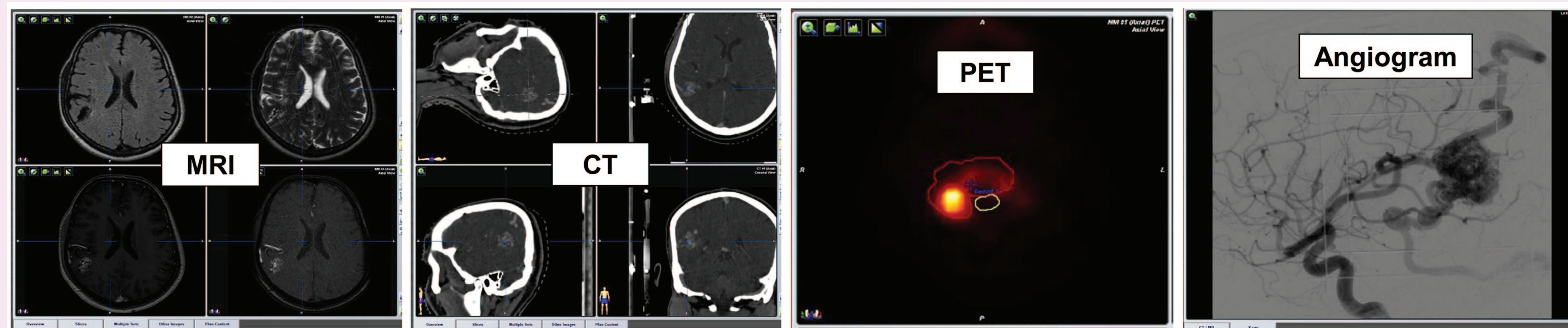
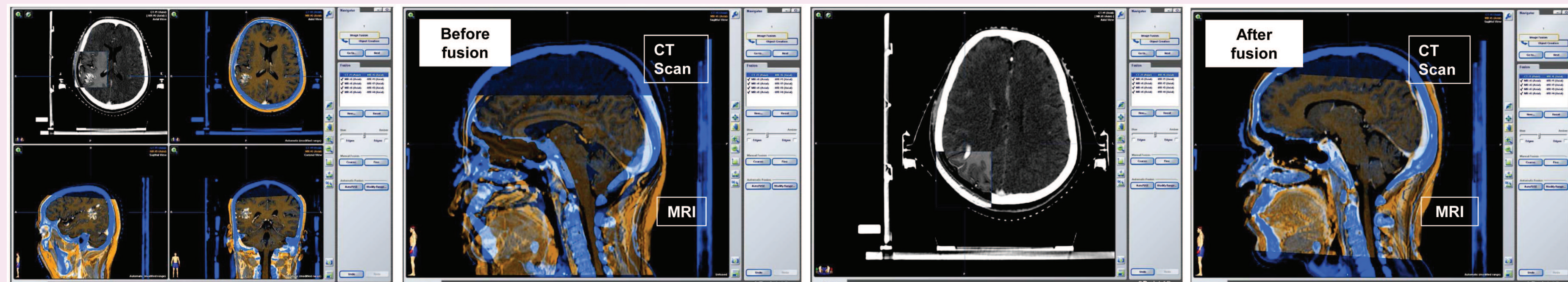
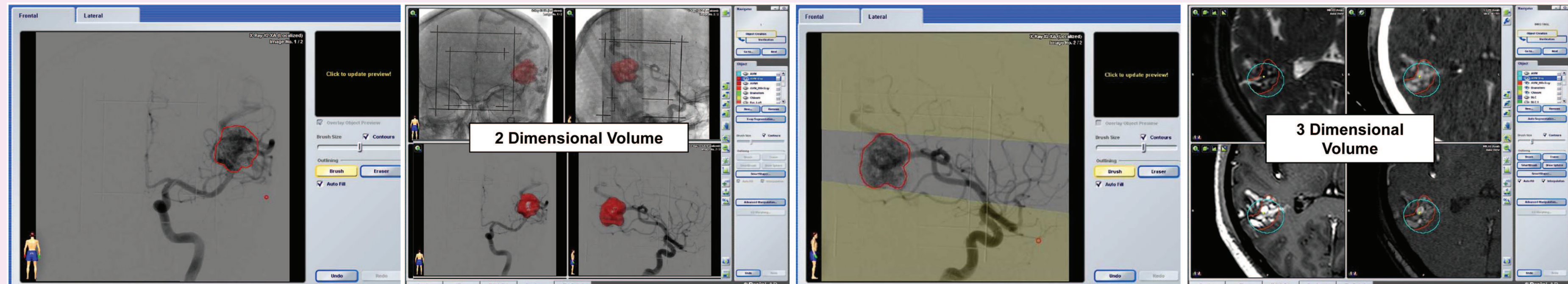


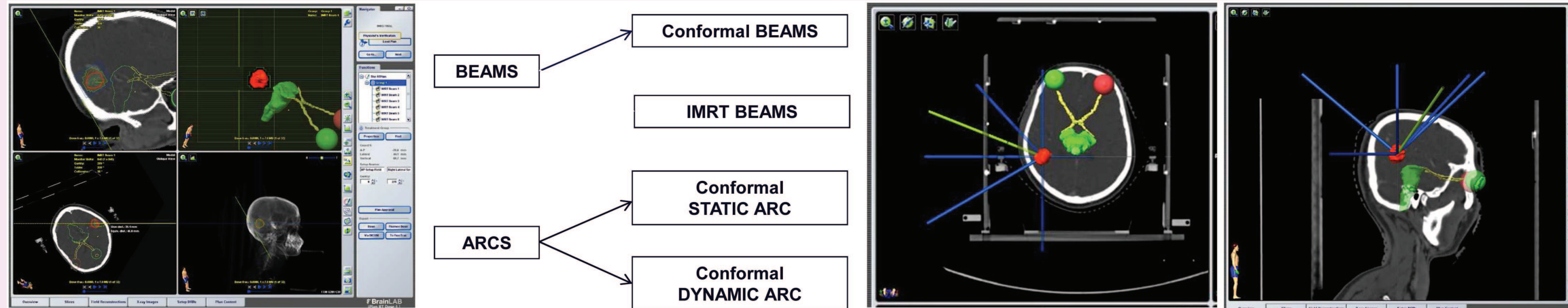
Image fusion



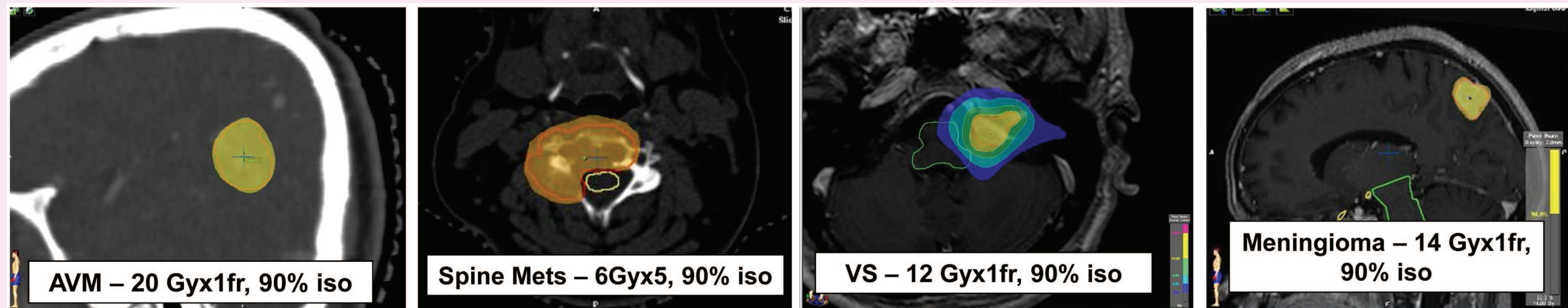
Volume Delineation



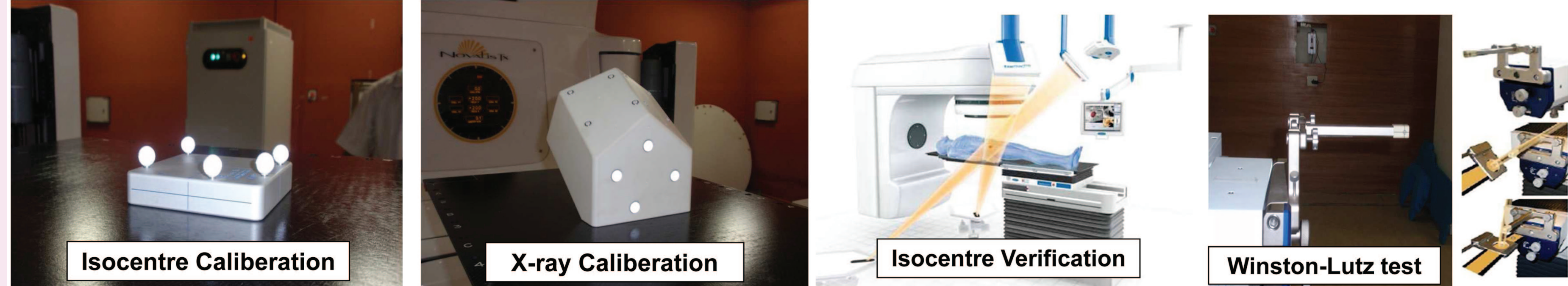
Stereotactic Planning



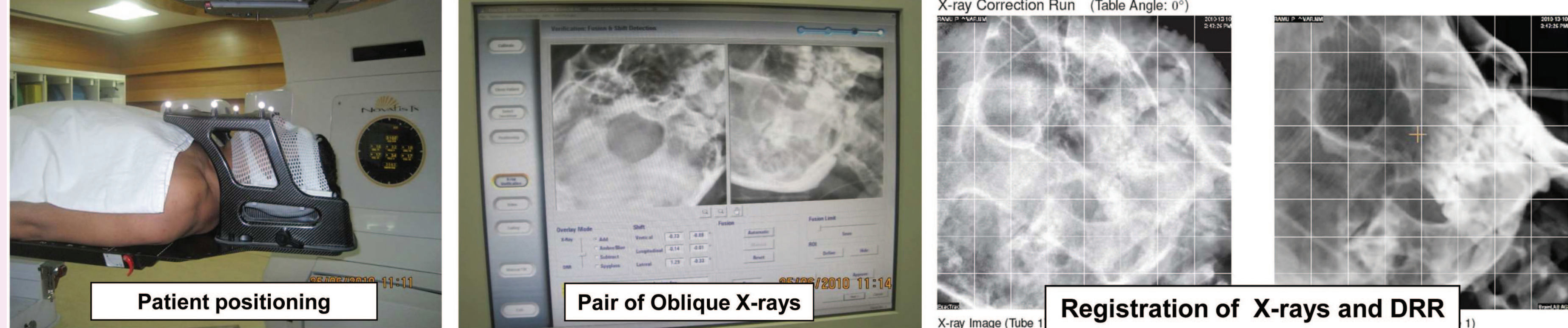
Dose Prescription



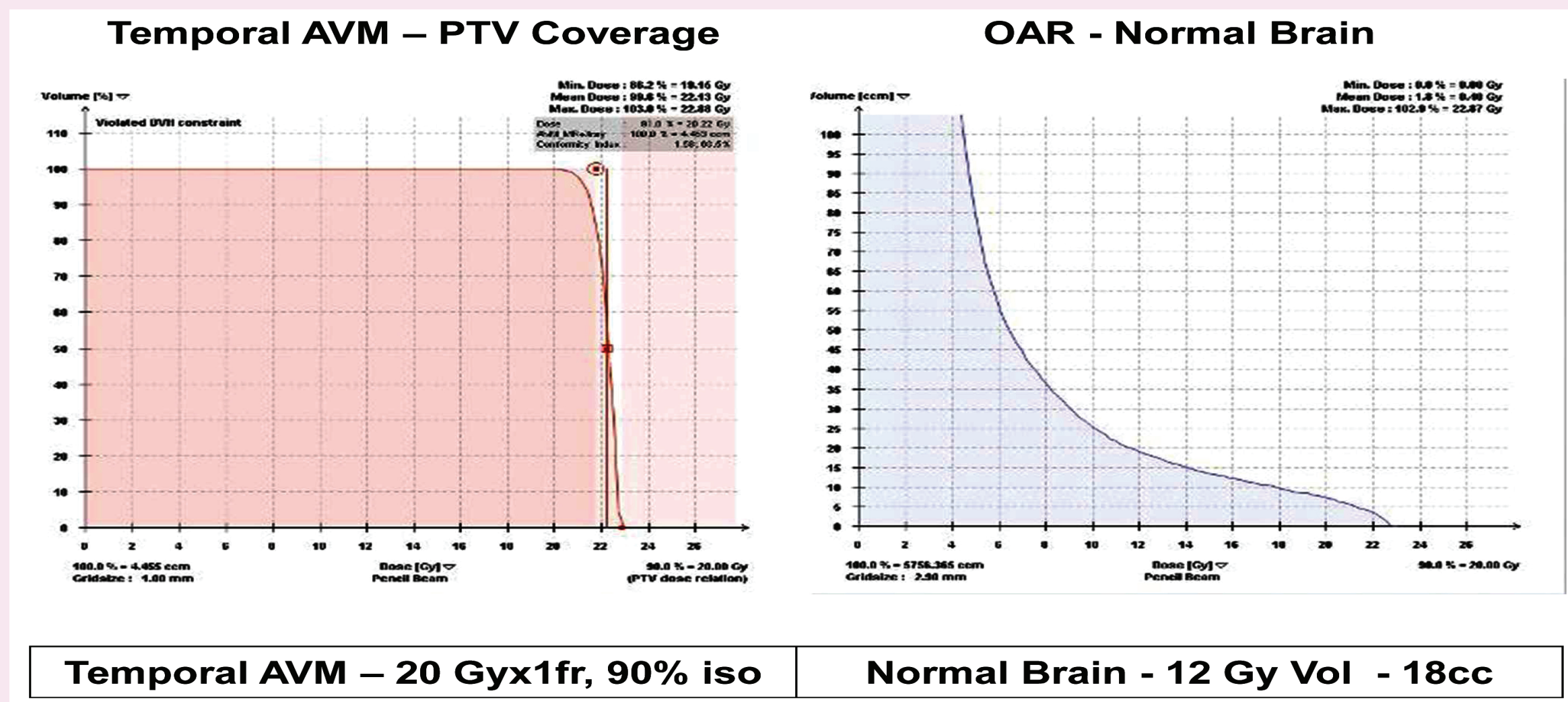
QA tests



Treatment Set-up



Plan Evaluation



Results (54 lesions in 50 patients)

Immobilization	
Mask	40 pts
Frame	10 pts
Fractionation	
Single fraction	40 pts
1-5 fractions	10 pts
SRS Planning	
Conformal Beams	1 pt
IMRT Beams	43 pts
Conformal Static Arc	--
Conformal Dynamic Arc	9 pts
Hybrid Plan	1 pt

Intracranial Schwannomas		
	Single fraction SRS (n=15)	Fractionated SRS (n=3)
Mean Volume (cc)	3.27(0.29-10.56)	7.2(0.17-18.62)
Mean Dose (Gy)	12.46(12-15)	22.6(18-25 in 3-5fr)

Intracranial AVMs		
	Single fraction SRS (n=4)	Fractionated SRS (n=6)
Mean Volume (cc)	8.6 (4.4-11.3)	19.1(10-31.03)
Mean Dose (Gy)	18 (16-20)	33.3 (28-35)

Intracranial Metastases		
	Single fraction SRS (n=9)	Fractionated SRS (n=1)
Mean Volume (cc)	1.8 (0.24-4.7)	1.5
Mean Dose (Gy)	18.6 (16-22)	35 (in 5fr)

Spine Metastases		
	Single fraction SRS (n=0)	Fractionated SRS (n=8)
Mean Volume (cc)		54(14.5-106)
Mean Dose (Gy)		25(21-30)

Intracranial Meningiomas		
	Single fraction SRS (n=2)	Fractionated SRS (n=2)
Mean Volume (cc)	4	5.1 (2.85-7.48)
Mean Dose (Gy)	14	25 (in 5fr)

Pituitary Adenomas		
	Single fraction SRS (n=2)	Fractionated SRS (n=0)
Mean Volume (cc)	1.6 (0.39-2.85)	--
Mean Dose (Gy)	17.5 (15-20)	-

Follow-up

Indication	Status
Vestibular Schwannoma	- Symptomatically stable - Hearing tests – status quo
Intracranial AVMs	Symptomatically better
Intracranial Metastasis	- Symptomatically better - MRI (at 3 mo) - reduction in size
Spinal Metastasis	- Pain relief in 2 weeks - No neurological complications
All patients' median follow up 6 months (range 0-12 months)	

Conclusions

- Novalis Tx linear accelerator is a versatile machine for stereotactic radiosurgery treatment in addition to routine radiation therapy.
- Cranial and Spinal stereotactic radiosurgeries for various indications are being performed on Novalis Tx.
- Exac Trac image guided treatment delivery provides advantages of frameless, precise and fractionated radiosurgery with short set-up time.

References

- Whang CJ, et al. First experience in using Novalis shaped beam radiosurgery in Korea. J Neurosurg. 2004 Nov;101 Suppl 3:341-5. Inje University, Gyoung gi, KR
- Chen JC, et al. Contemporary methods of radiosurgery treatment with the Novalis linear accelerator system. Neurosurg Focus. 2007;23(6):E4. Southern California Permanente Medical Group, Los Angeles
- Wurm RE, et al. Novalis frameless image-guided noninvasive radiosurgery: initial experience. Neurosurgery. 2008 May;62(5 Suppl):A11-8; Charité-Universitätsmedizin Berlin