OBSTETRIC MRI: HOW WE DO IT IN SHEFFIELD

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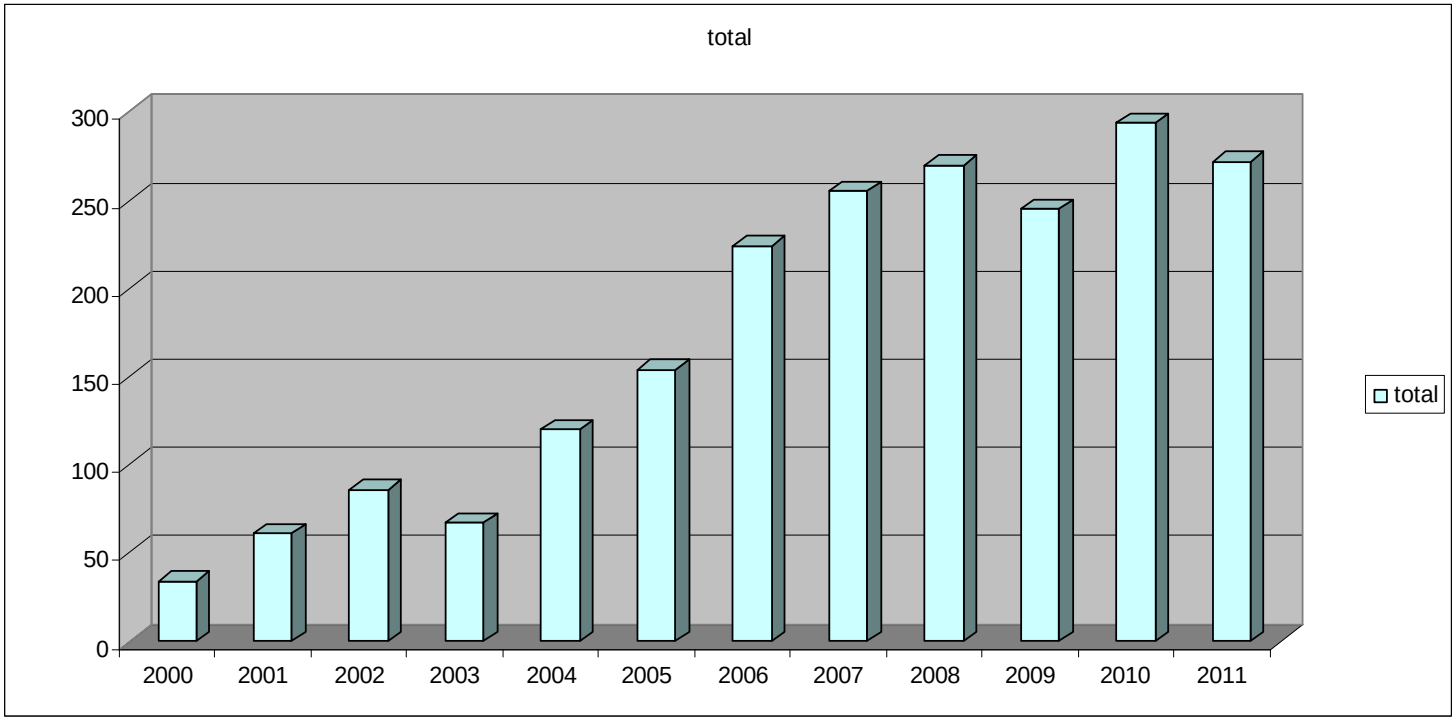
OBSTETRIC MRI: A Practical Guide

- Patient Management and Care
- Placenta and Foetal MRI
- Scanning Technique
- Sequences Used

BACKGROUND

- First Scans in 1998
- Number of scans increased from 3 to over 250 per annum



Equipment

- GE 1.5T HDx Scanner
- 8 Channel HR Cardiac Coil

PATIENT MANAGEMENT and CARE

- Appointment within 1 week unless clinically indicated otherwise
- Partners/Relatives included (at patient request)
- Safety forms completed and checked
- Feedback/Results given after scan
- Contact details given for further queries

PATIENT MANAGEMENT and CARE

- Patient appropriately dressed
- Clear Explanation of Scan
- Patient into scanner Feet First either supine or on side
- Radiologist oversees scan

SCAN TECHNIQUE: Foetal MRI

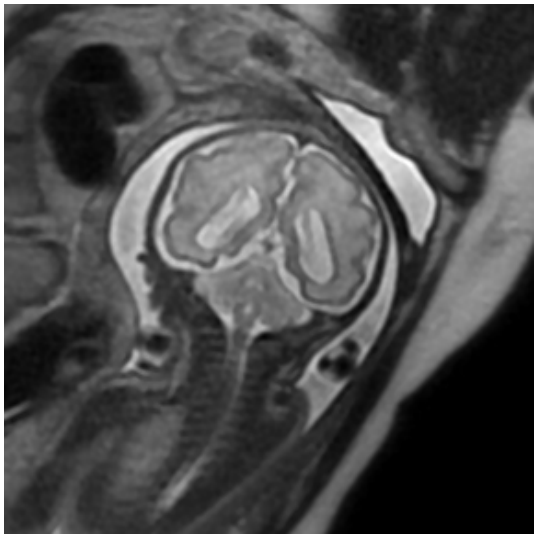
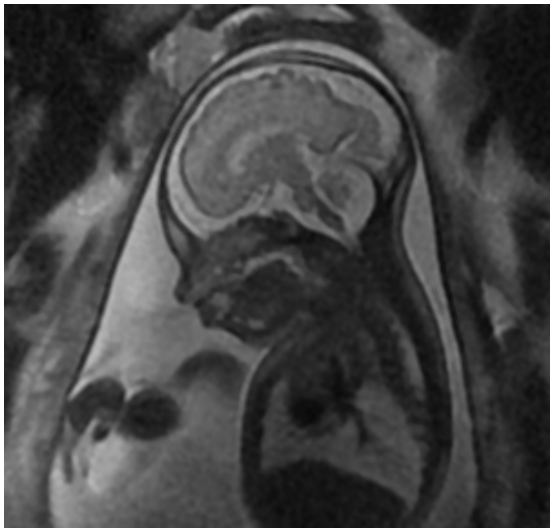
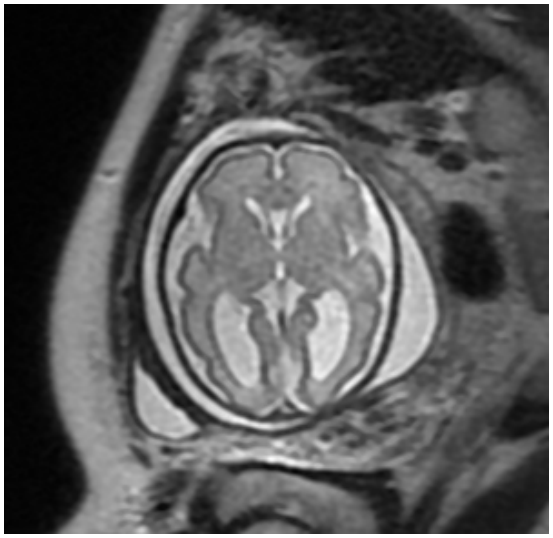
- True Anatomical Planes of Foetus Acquired
- Speed is Key
- Sequences not annotated, each a localiser for next

SEQUENCES USED: Foetal MRI

- T2w Single Shot Fast Spin Echo
- FIESTA- T2w Balanced Gradient Echo
- T1w- Fast Gradient Echo/Spoiled GE
- FLAIR (brain only)
- Diffusion Weighted Imaging
- MOVIE

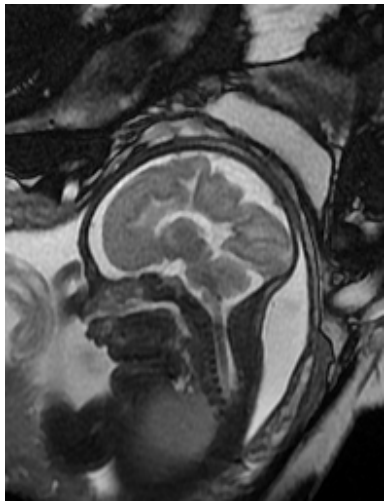
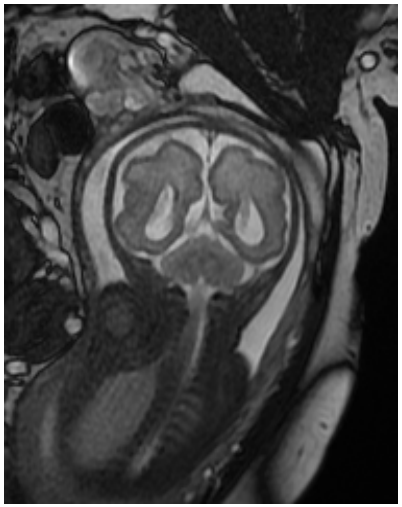
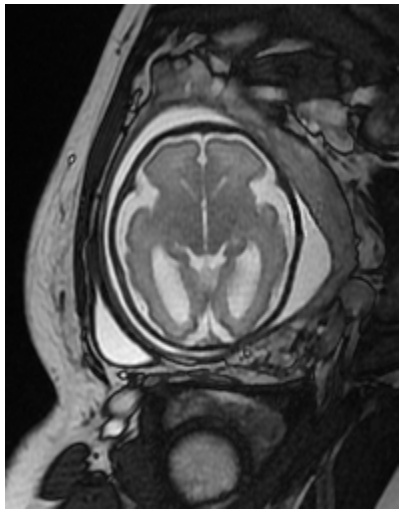
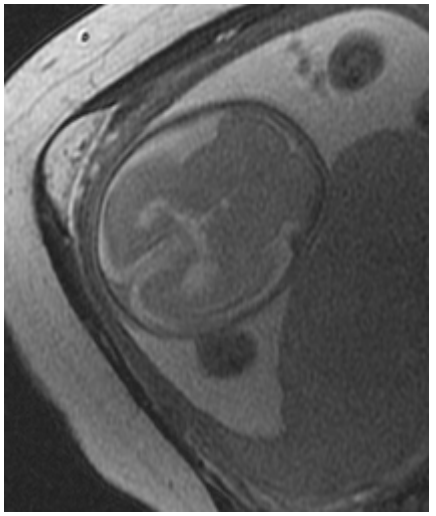
Single Shot Fast Spin Echo

- Core MRI sequence
- Fast- 2 slices/3 seconds
- All 3 planes of Foetus
- 5mm and 3mm slice thickness, 0 Gap

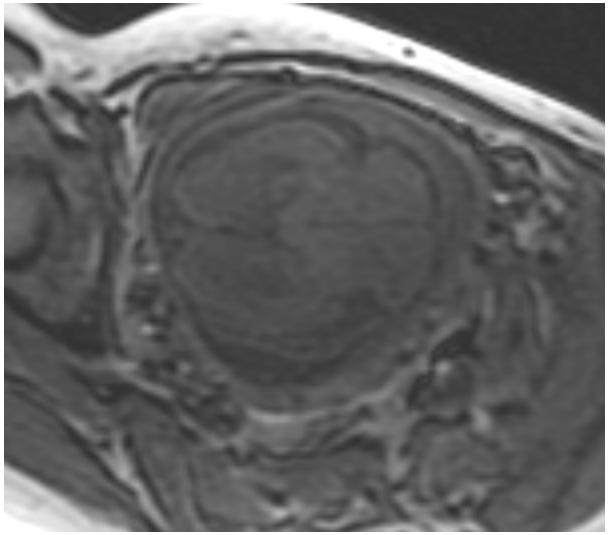
FIESTA

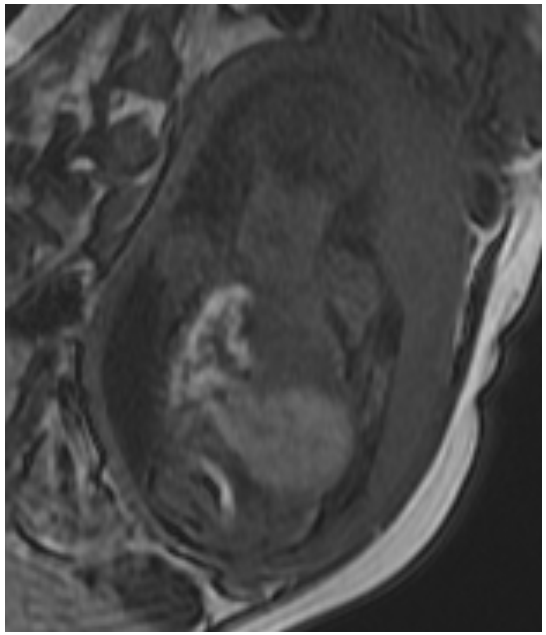
- Acquired in 3 planes, 5mm slices.
- Faster than SSFSE so less sensitive to movement
- High SNR and CNR

T1- Fast Gradient Echo/Fast Spoiled Gradient Echo

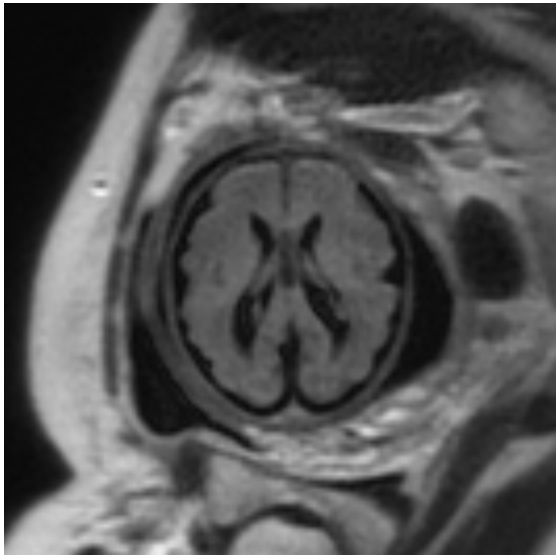
- FGRE- Better Contrast for Brain- identifies possible bleed- Axial plane 5mm slices
- FSPGR- Better Contrast for Body- helps locate Liver/Bowel

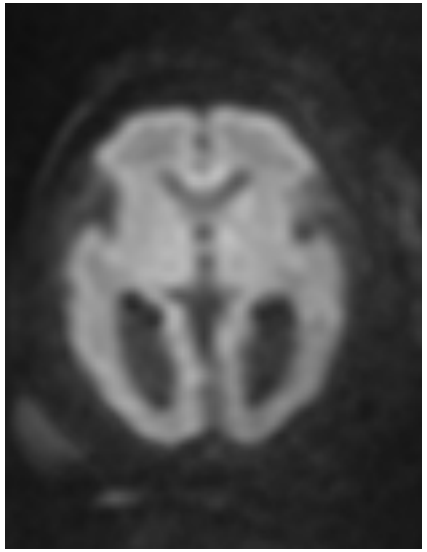


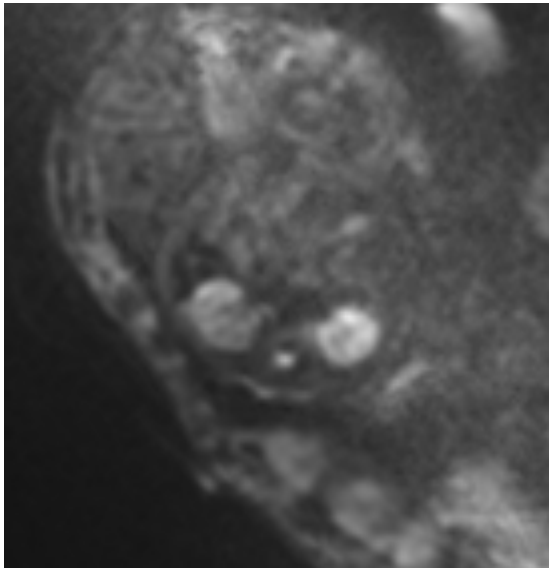


FLAIR and DWI

- Useful for identifying/clarifying abnormal signal in brain
- Brain DWI b-value 700, axial 5mm slices
- Body DWI b-value 500-axial 5mm slices-useful to locate kidneys

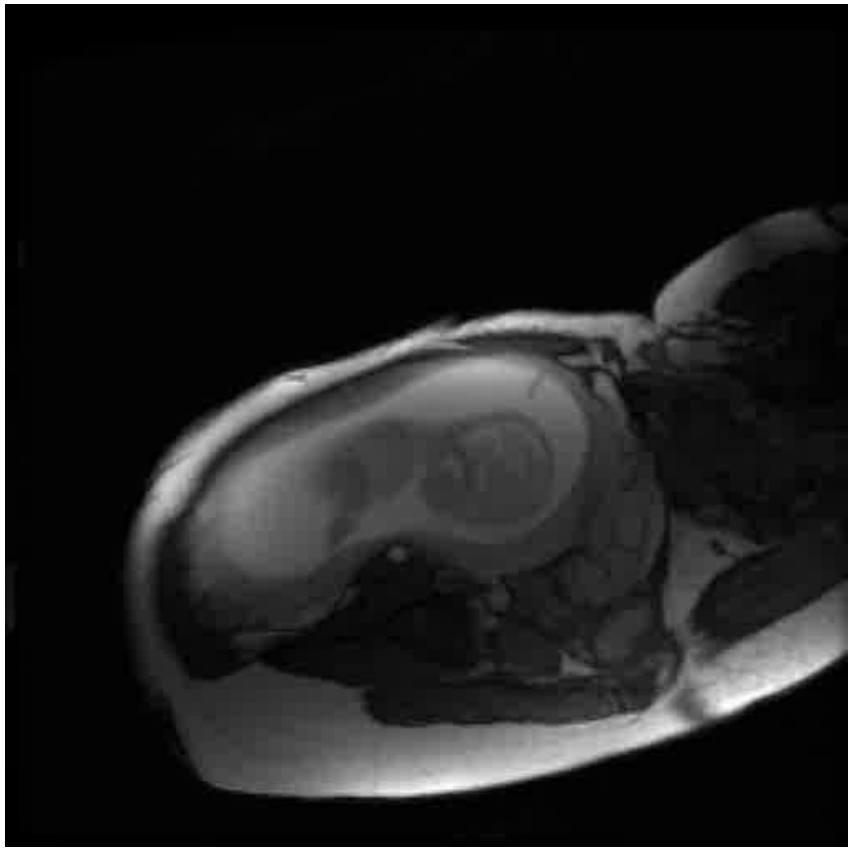






MOVIE

- Multiphase, 45 Seconds to Acquire
- Asses Swallow/ Diaphragm movement

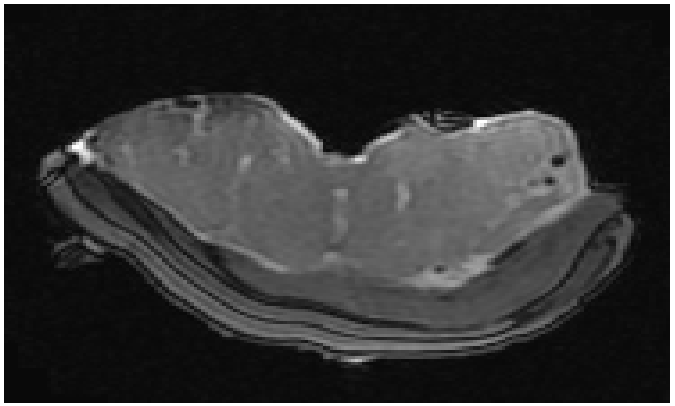


MRI of the PLACENTA

- Recent increase in referrals
- Aim to determine any invasion and extent (Accreta/Percreta/Increta)
- Patients scanned at 32/40 weeks
- Scans Acquired using Anatomical planes of mother and full placental imaged.

SEQUENCE DEVELOPMENT

- Sequence to identify key invasion signs which are:
  - - Dark intra-placental bands
  - - Uterine bulging
  - - Loss of heterogeneity of placenta signal
- Phantom constructed using belly pork and a recently delivered, donated placenta.

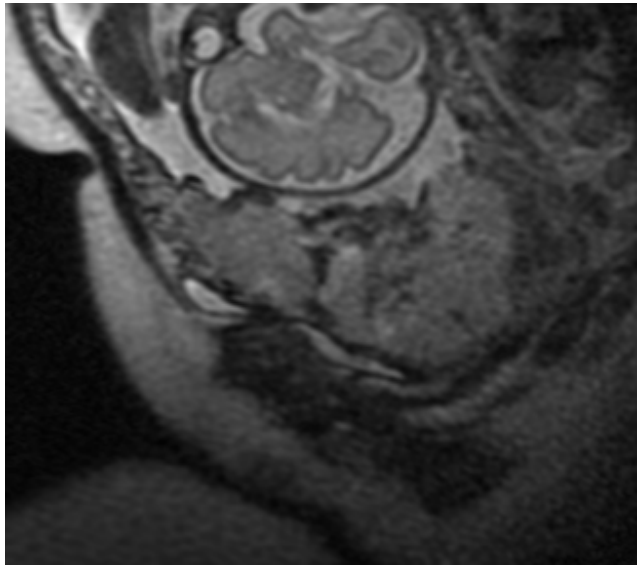


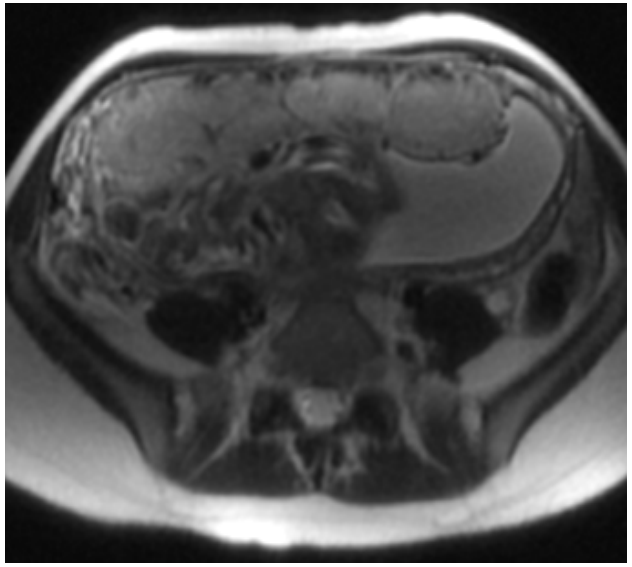
SEQUENCES USED: Placenta MRI

- T2w SSFSE
- FIESTA
- T1 FGRE
- DWI

Placenta SSFSE

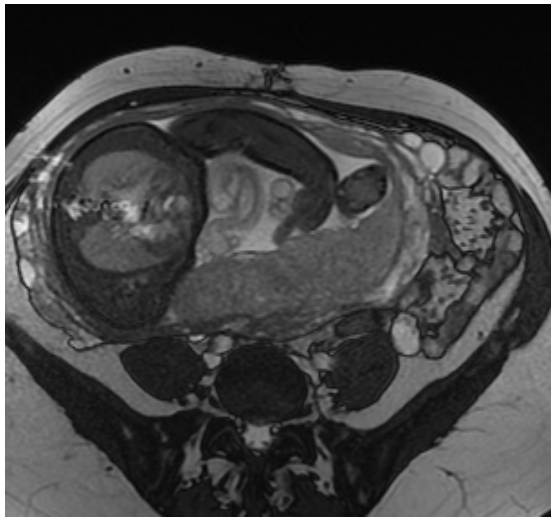
- 5mm- Axial, Sagittal and Coronal
- 3mm- Axial and Sagittal
- identifies any dark intra-placental banding and assesses heterogeneity.

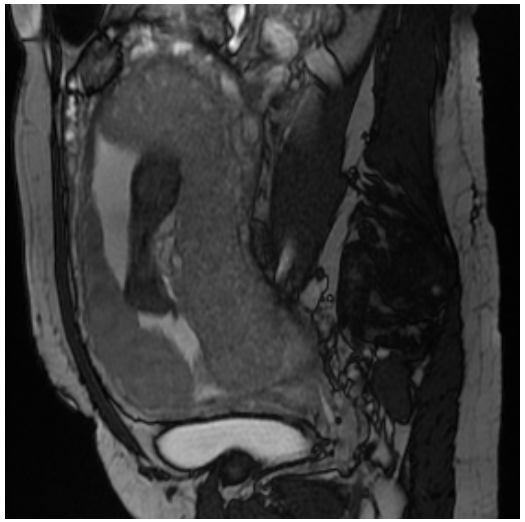




Placenta: FIESTA

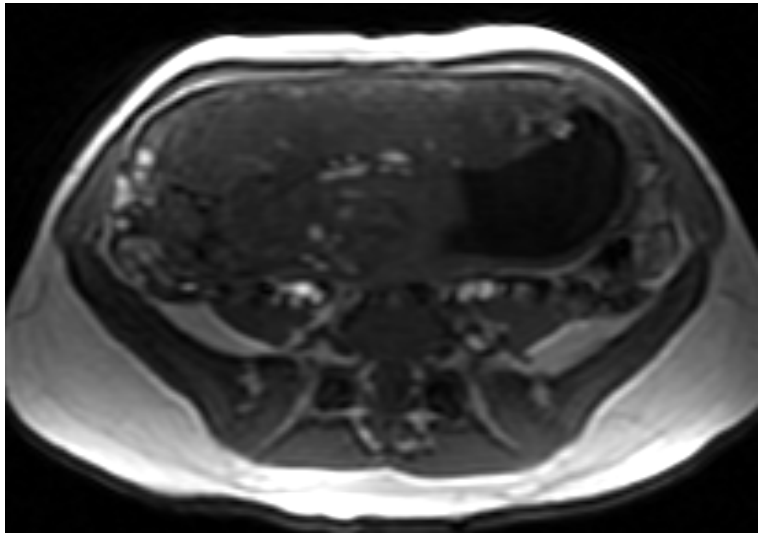
- 4mm slices- whole placenta in axial and sagittal planes.
- Delineates the placenta/myometrium borders, identifies uterine bulging
- Placenta becomes relatively featureless- banding or heterogeneity is lost.

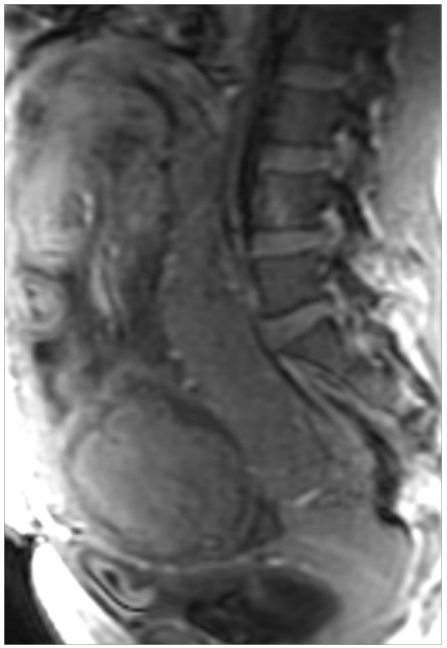


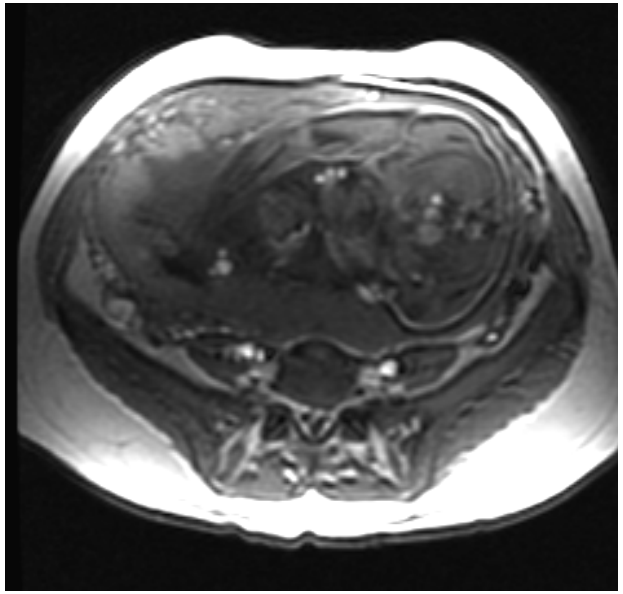


Placenta: T1 FGRE

- 5mm slices- axial and sagittal planes
- Identifies Haemorrhage and retro-placental bleeding

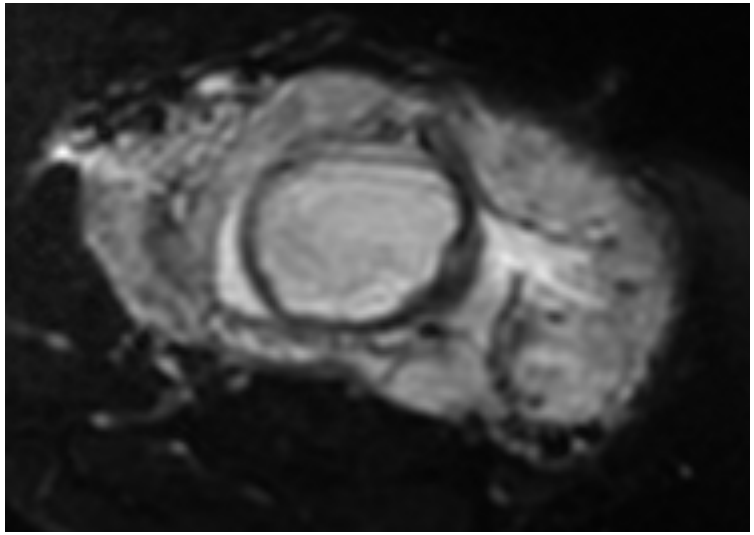






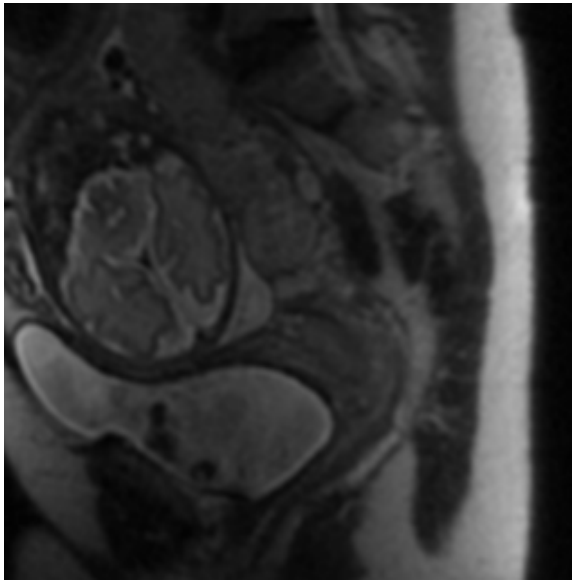
Placenta DWI

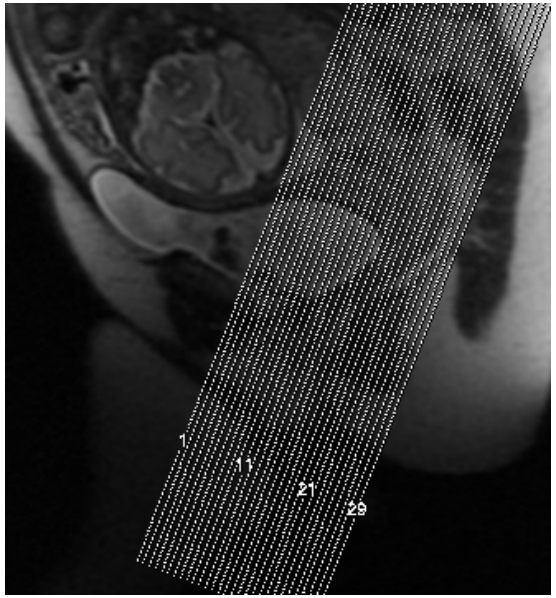
- B value 1000 sec/mm2- placenta higher signal than myometrium
- 3 minute scan- Axial plane only

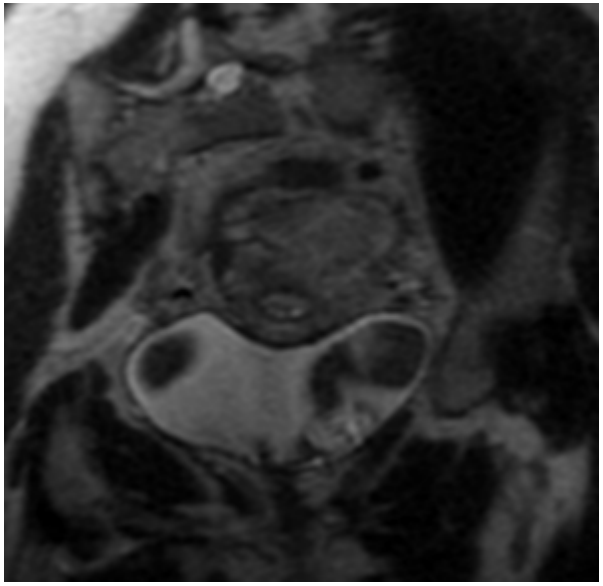


Placenta Location

- 3mm slices parallel/perpendicular to birth canal







THANKYOU

	Sequence	TR	TE	FLIP	BW	TI	PREP TIME	NEX	Slice Thickness / Slice Gap mm	FOV (Adjustd to patient)	Freq/ Phase Matrix	B Value	Scan Time (Secs)
T2 SSFSE	Single shot FSE	MIN (2000)	90	-	62.5	-	-	1	5 and 3 no gap	38	256/256		28
FIESTA	Balanced GE	MIN (4.8)	MIN (2.1)	60	125	-	-	1	40	4/0	384/256		15
T1	FGRE	MIN (5)	MIN (2)	40	31	-	2000	1	5/0	45	192/128		26
T1 BH	FSPGR	MIN (11.5)	MIN (1.7)	80	31	-	-	1	5/0	38	192/128		16
FLAIR	Single Shot IR prepared FSE	MIN (2700)	122	-	41	2000	-	0.5	5/1	36	224/224		25
DWI BRAIN BODY	EPI	4000	MIN 108	-	250	-	-	4	5/1.5	40	128/128	700 500	64
MOVIE	Multi phase	4.8	3	45	166	-	-	1	12/0	40	192/256		44