

Ultrasound in paediatric oncology

DR TOM WATSON

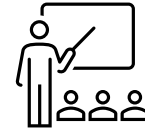
GREAT ORMOND STREET HOSPITAL

Disclosures

None

Aims

General principles of oncology ultrasound in children



Principles of imaging in abdominal and pelvic tumours in young children

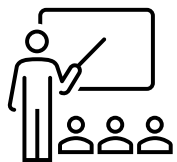


Intra-operative ultrasound in paediatric oncology



Cases with a focus on unusual or interesting ultrasound findings

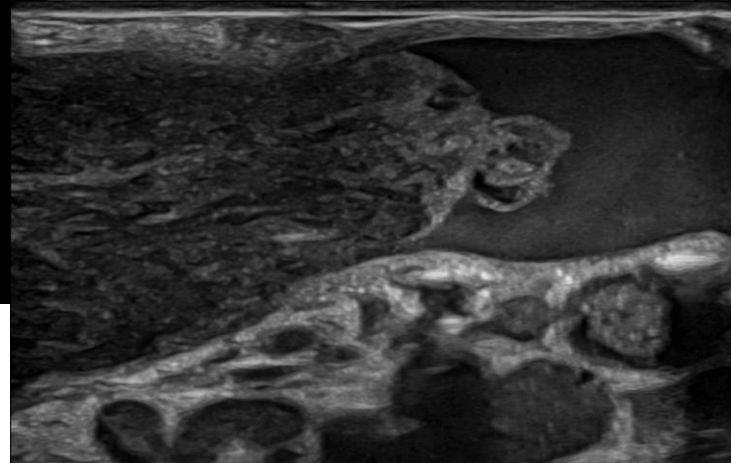
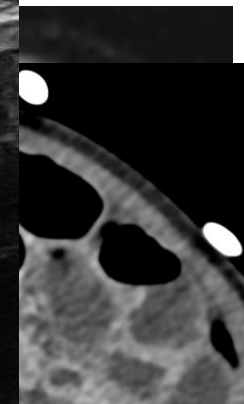
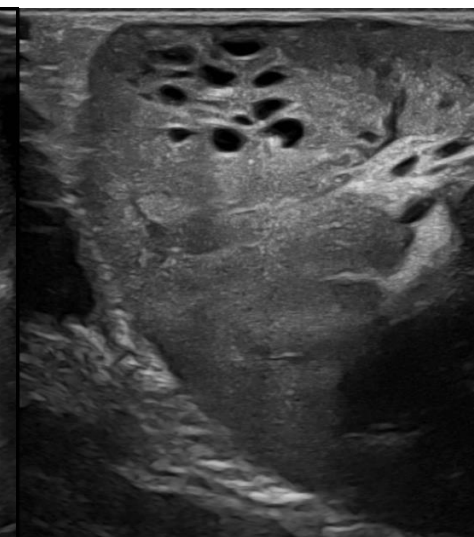
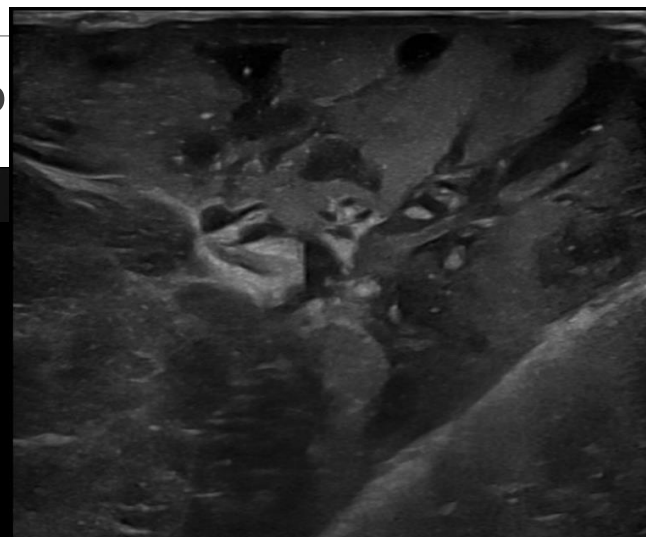




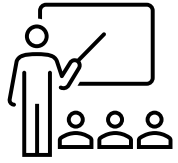
General principles

Why bother with ultrasound, why not go

- Easy access



LOGIQ



Benefits of ultrasound



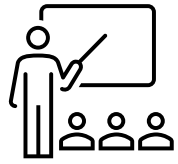


General principles

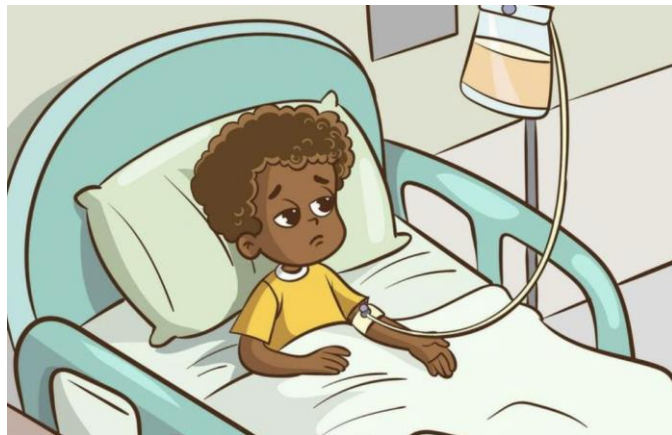
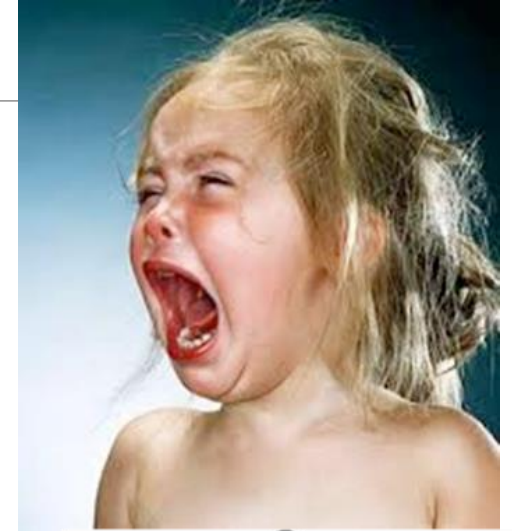
We are not histopathologists

Role of imaging

- Organ of origin?
- Local complications?
- Presence of distant metastases?



Additional factors...



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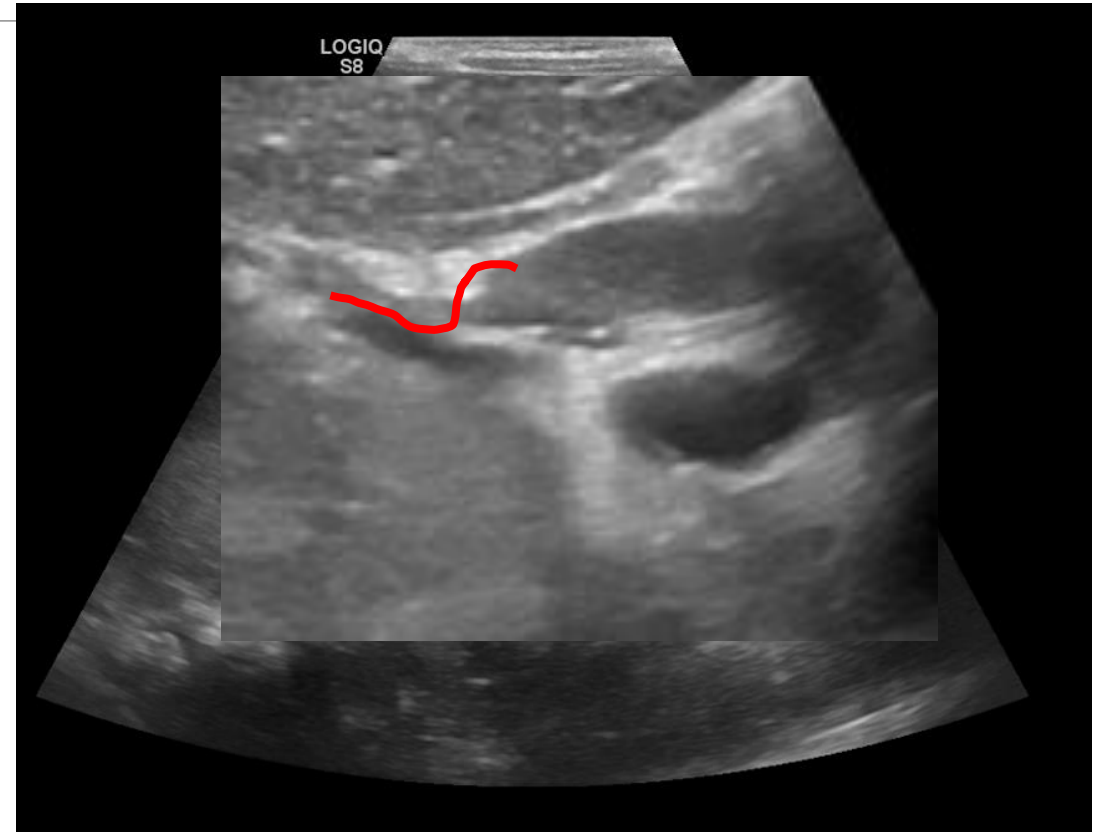
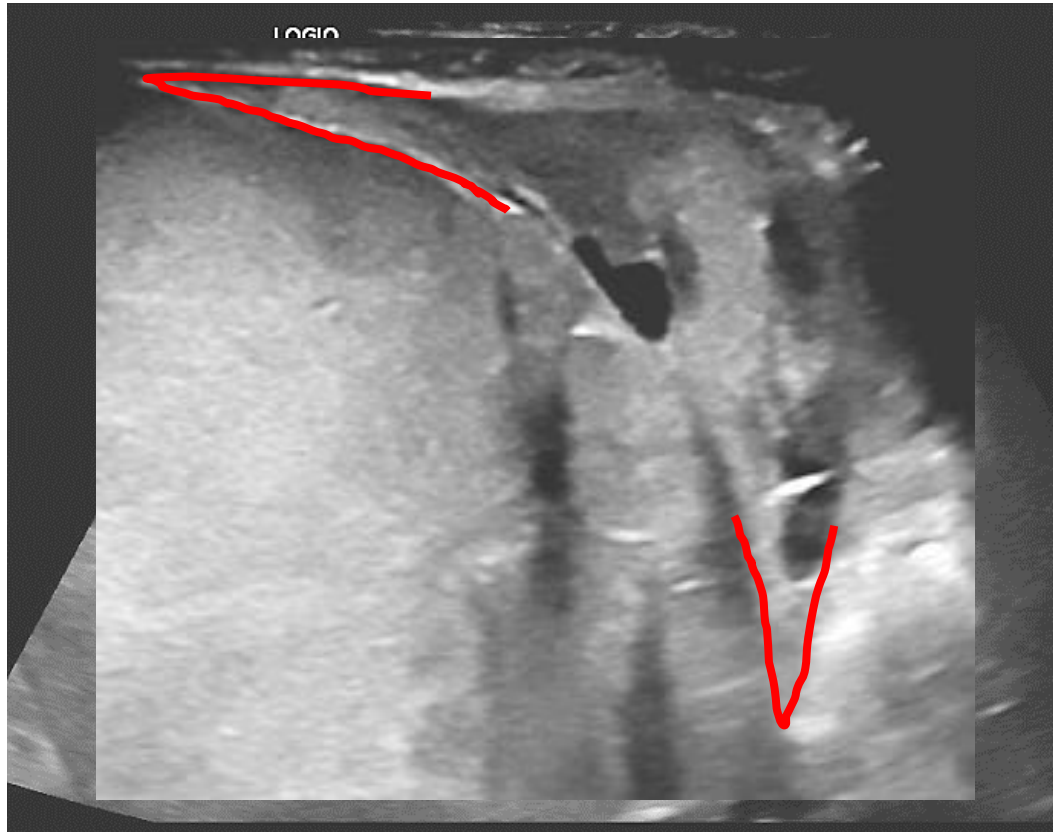


Cases with a focus on unusual or interesting ultrasound findings



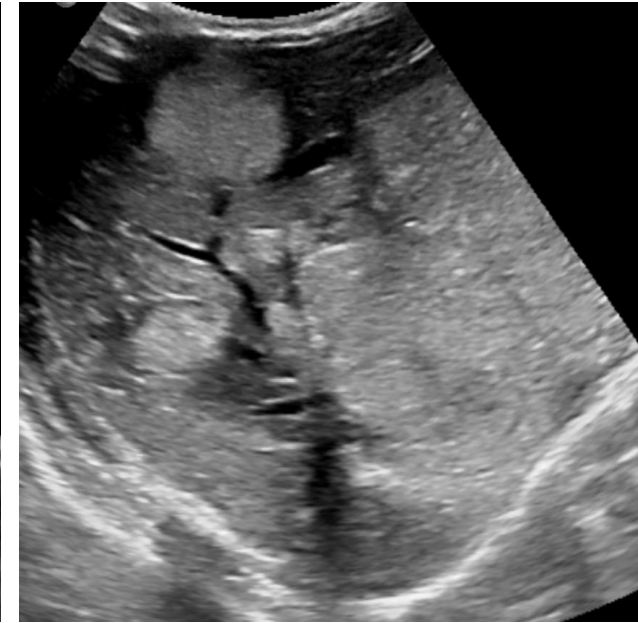
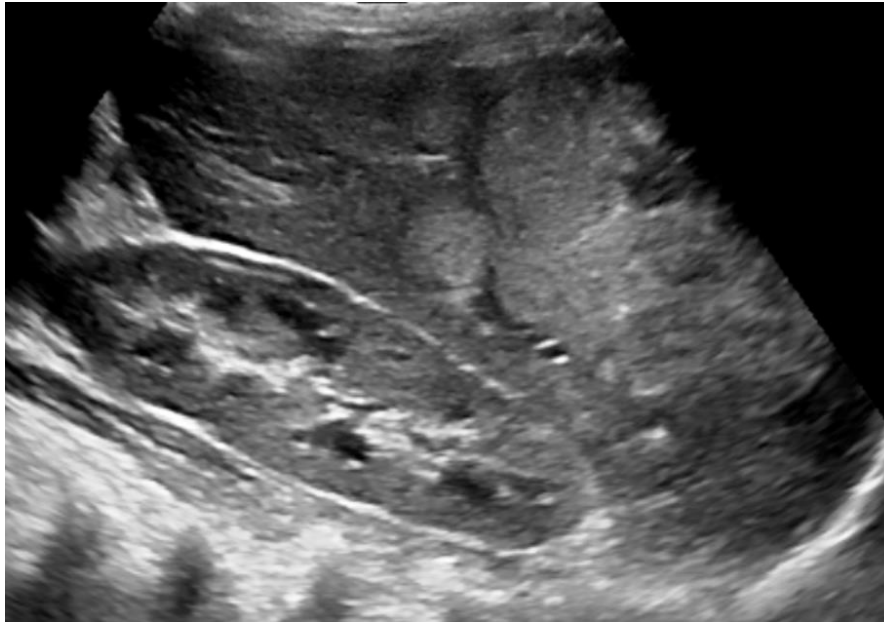
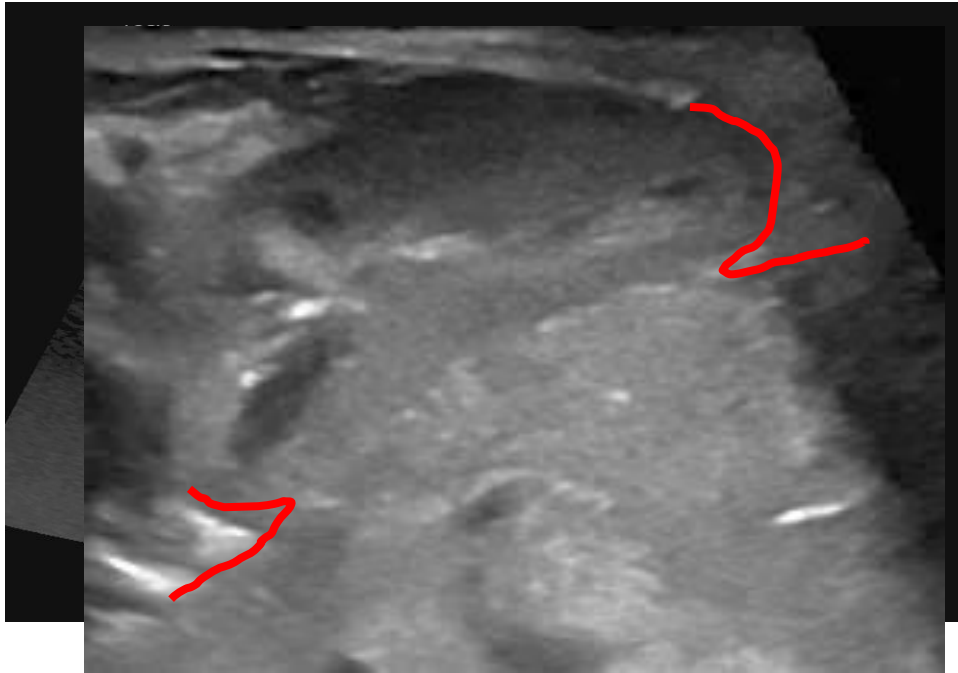


Principles of abdominal imaging



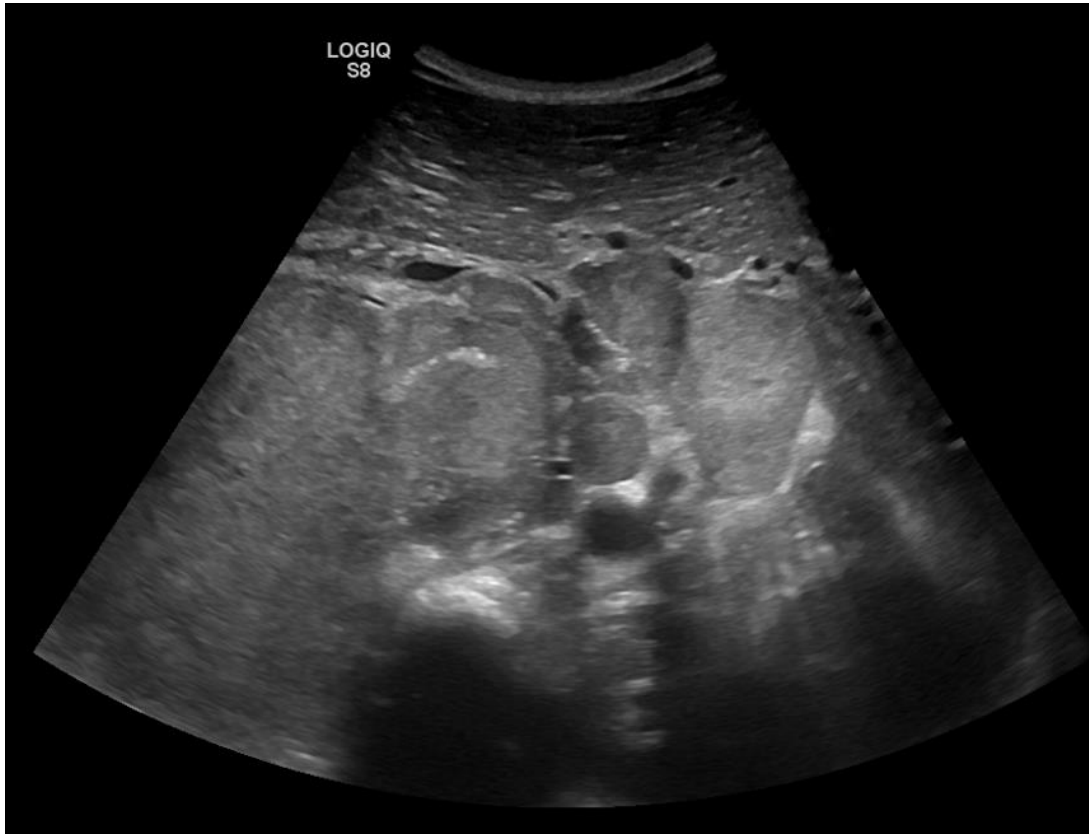


Principles of abdominal imaging





Principles of abdominal imaging





Principles of abdominal imaging

Is there a mass?

Where is it coming from?

Is there more than one?

What is the nature of the mass?

- Cystic or solid?
- Vascular?

What is happening to the big blood vessels of the abdomen?

Aims

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Intra-operative ultrasound in paediatric oncology



Cases with a focus on unusual or interesting ultrasound findings





Intra-operative ultrasound in paediatric oncology

Nephron-sparing surgery

- Bilateral Wilms tumour
- Unilateral Wilms tumour in child with a tumour predisposition

Tumour Thrombus assessment

Testicular sparing surgery

Partial cystectomy



Warning!

This part includes intra-operative photographs of actual operations



How?

Interested surgeons

'willing' radiologist (x2)

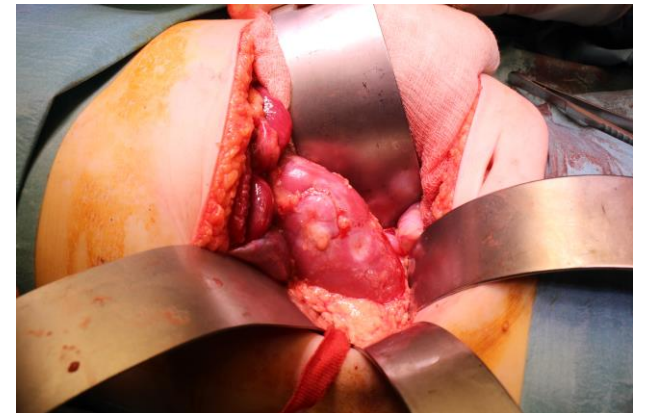
Pre-op planning

- Be realistic

Operating team notify radiologists when ready

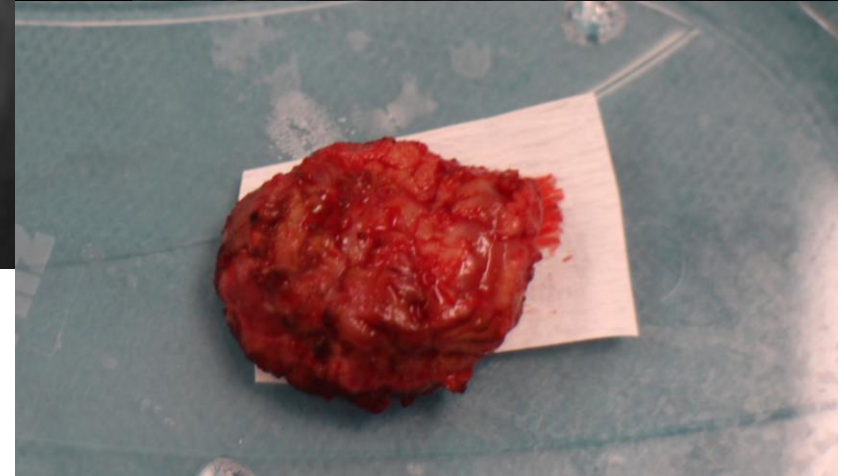
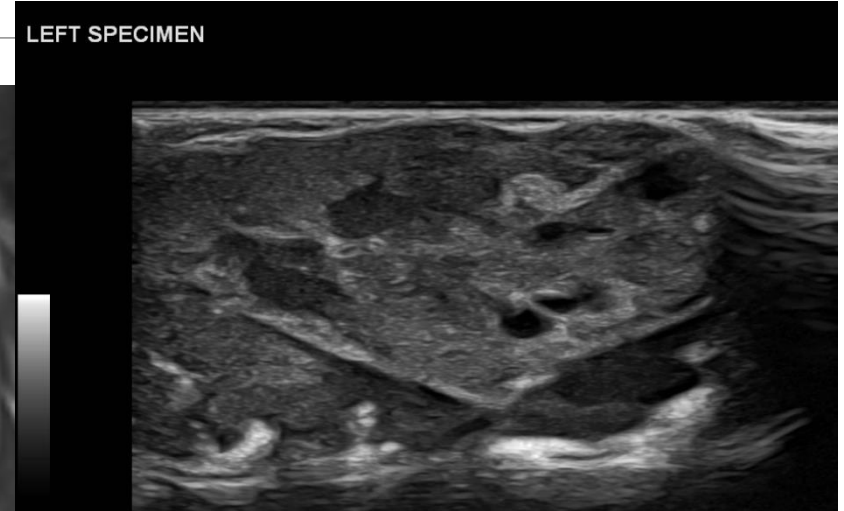
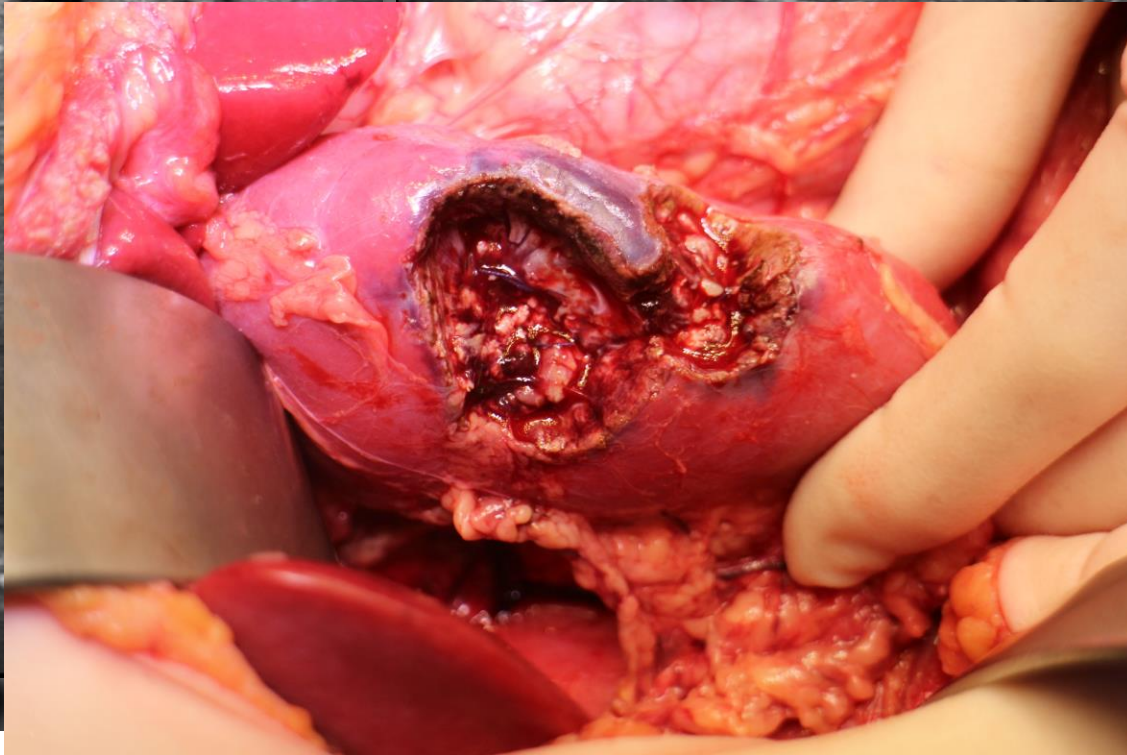
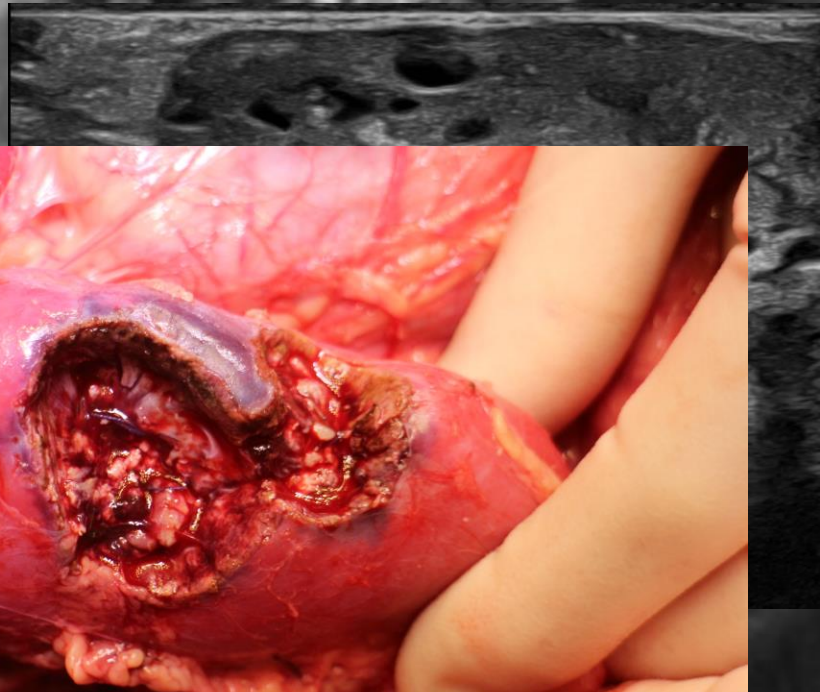
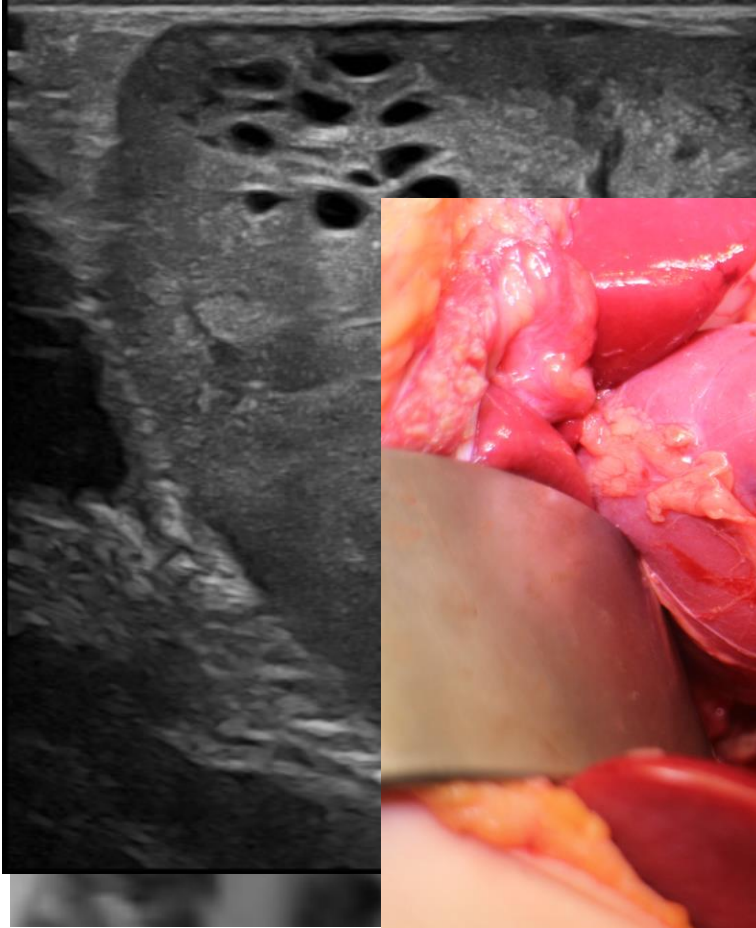
Review histopathology results

Debrief case





Nephron-sparing surgery



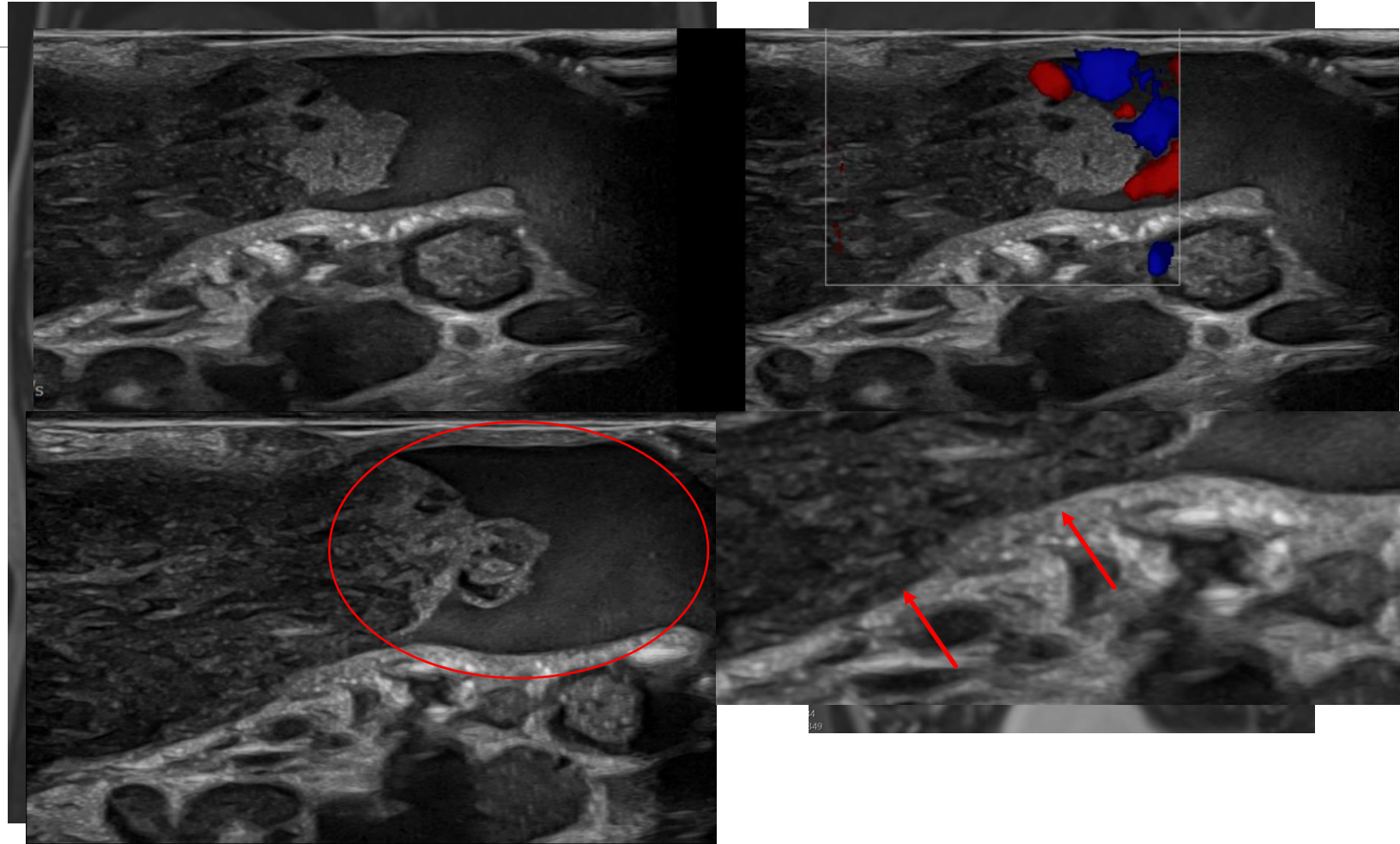


Tumour thrombus

Is there any tumour thrombus?

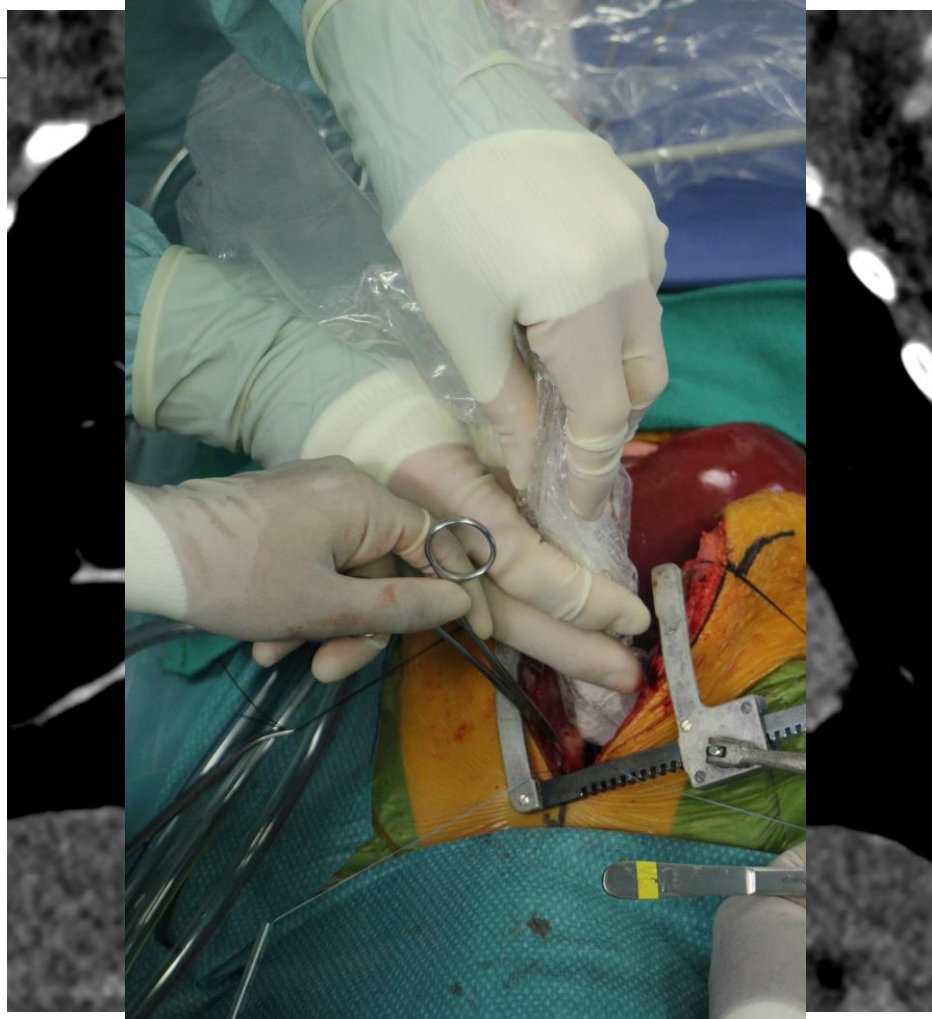
Where does it extend to?

- IVC?
- Renal vein?
- Pulmonary artery?





Tumour thrombus



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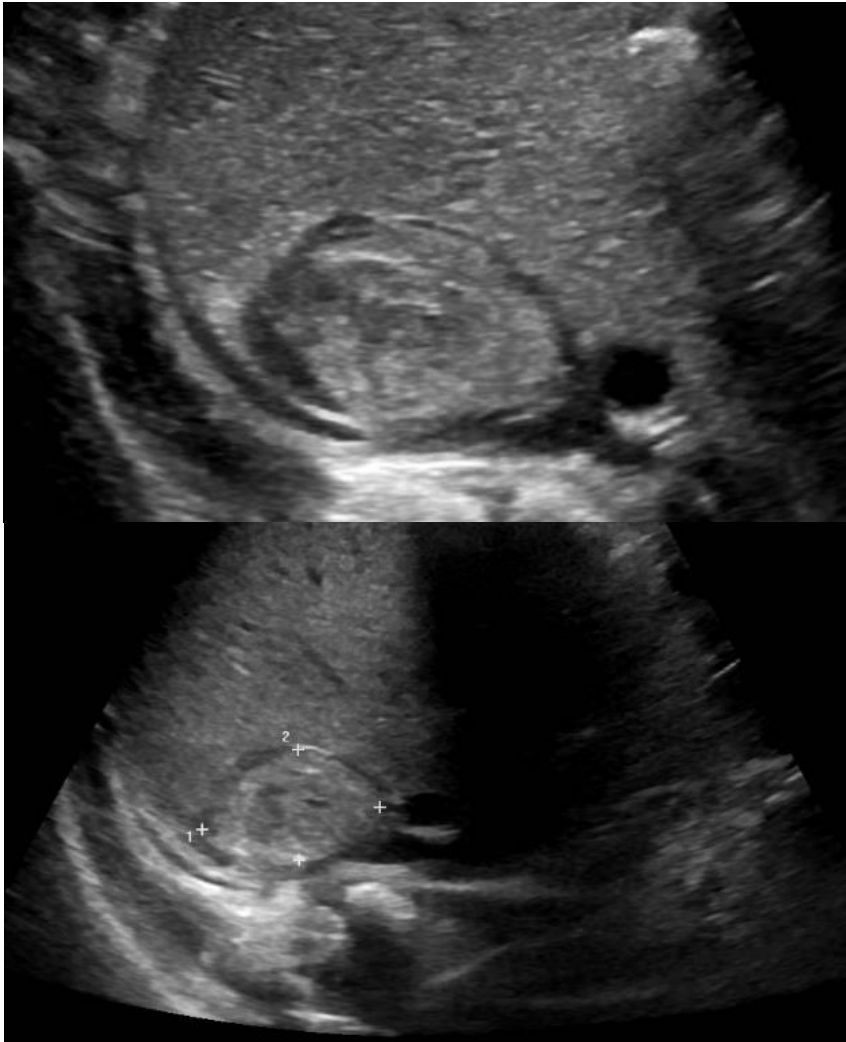


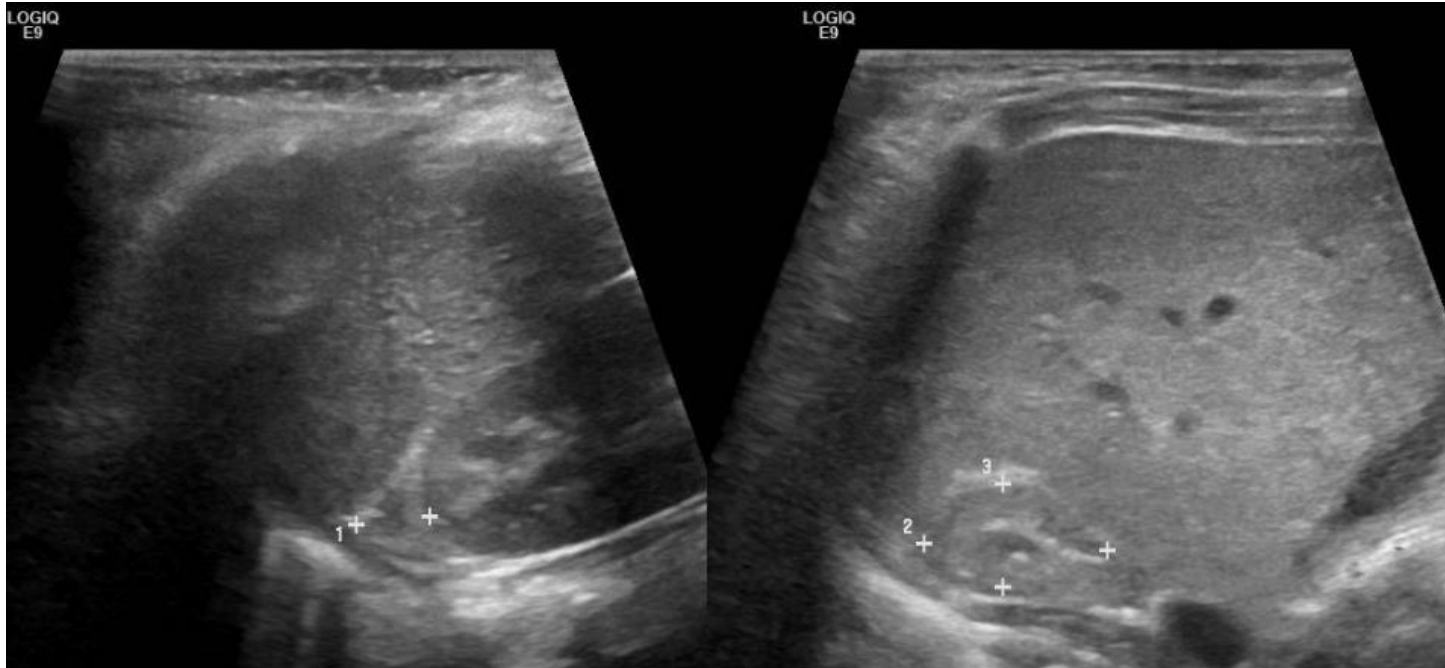
Case 1

Newborn baby

Born via forceps delivery

Jaundiced



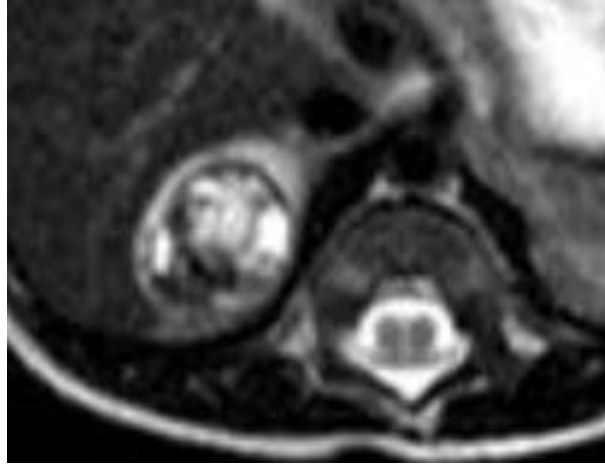


Case 1

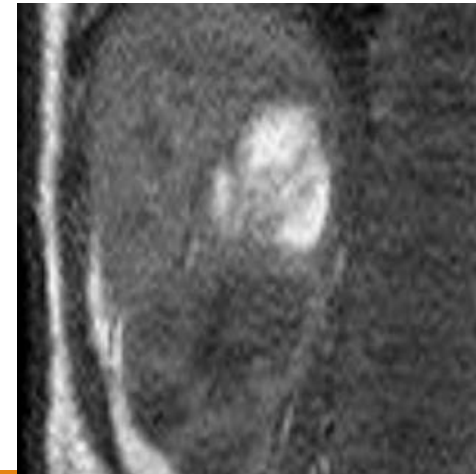
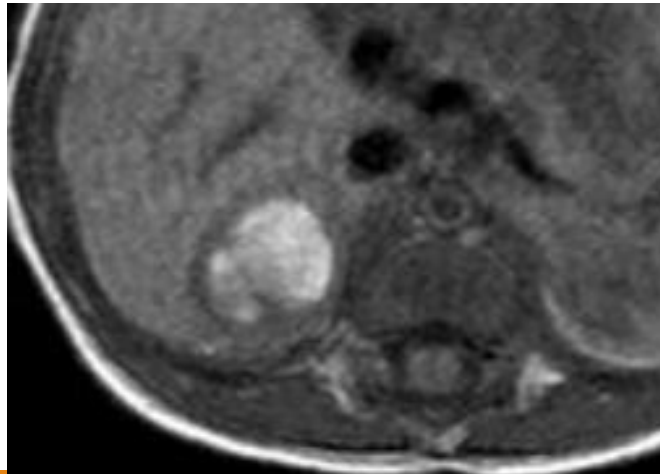
ONE WEEK LATER...

MRI

T2



T1



Adrenal haemorrhage

Occurs in neonates – neonatal adrenal is 10-20x larger than the adult adrenal

More common on the right

Aetiology is multifactorial

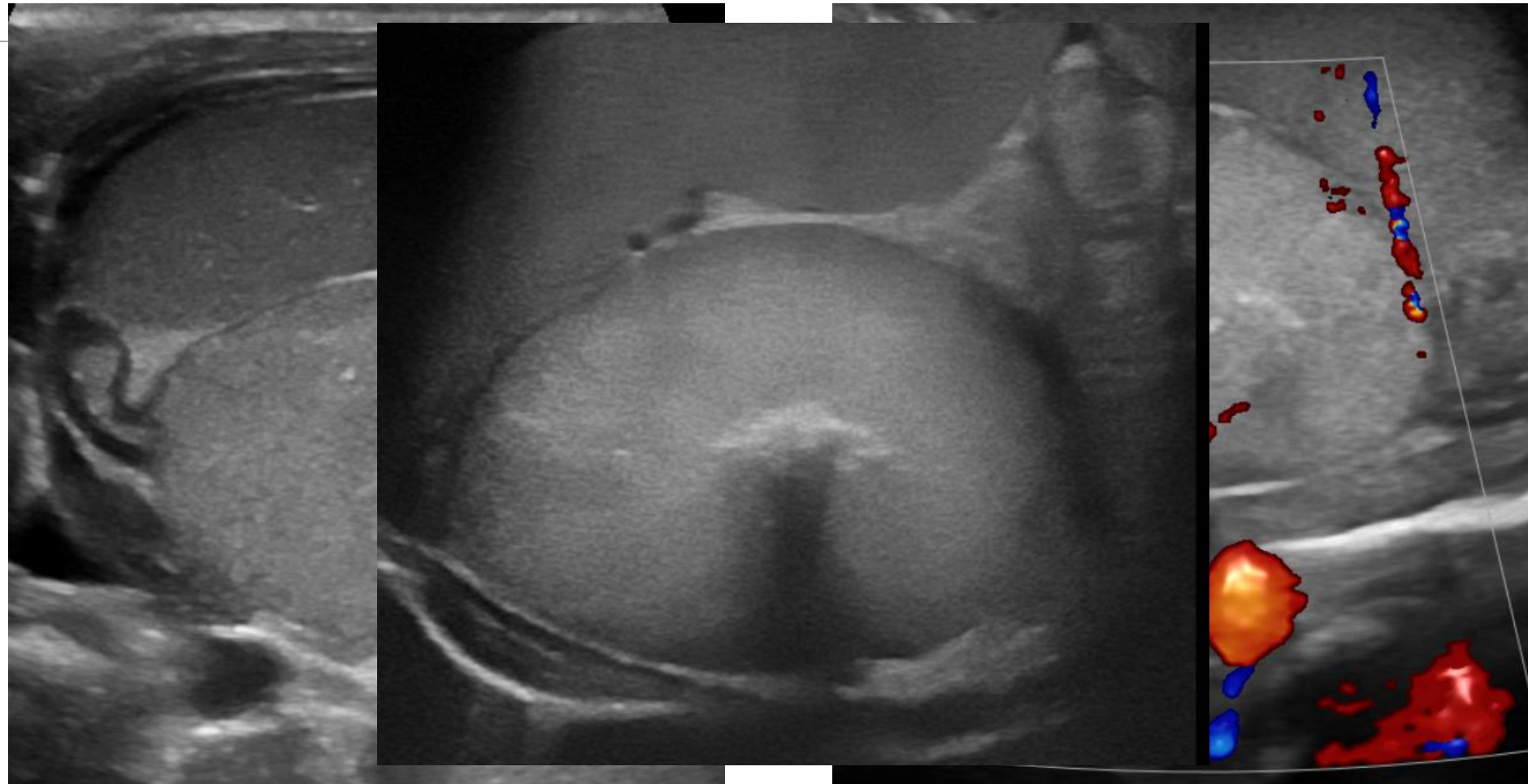
- Compressed by spine, liver and kidney
- IVC compression (right gland only)
- Renal vein thrombosis (typically left gland)
- Difficult delivery
- Neonatal stress
- Rapid involution of the fetal adrenal cortex after delivery

Function is retained until 90% of the gland is lost

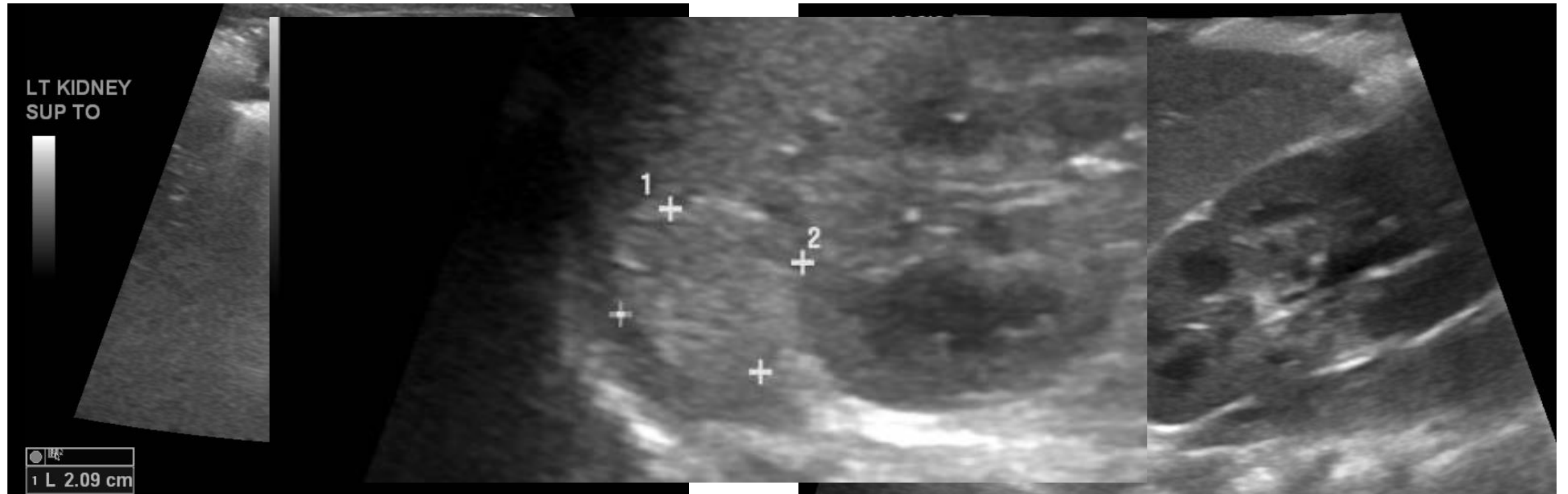
Bilateral haemorrhage does occur but is rare

Jaundice is a common presenting feature

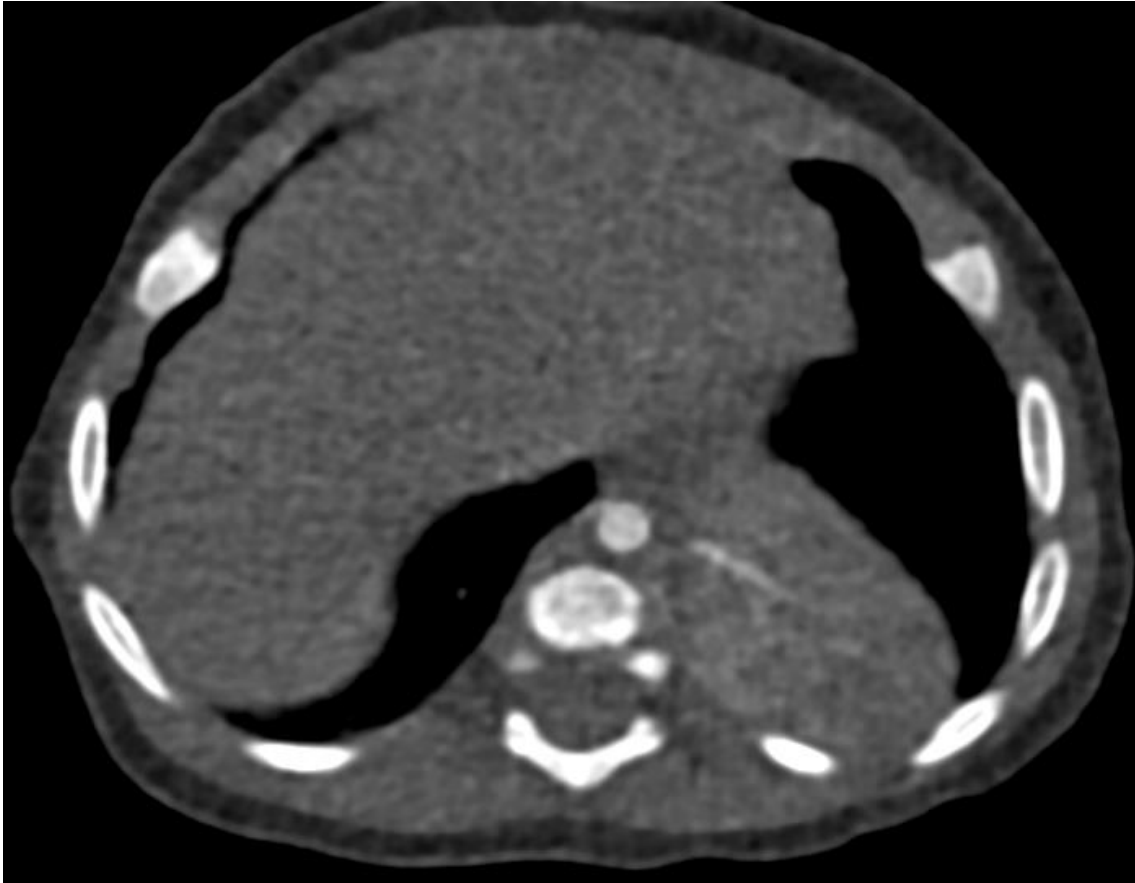
Case 2



Case 3



Case 3



Extra-lobar sequestration

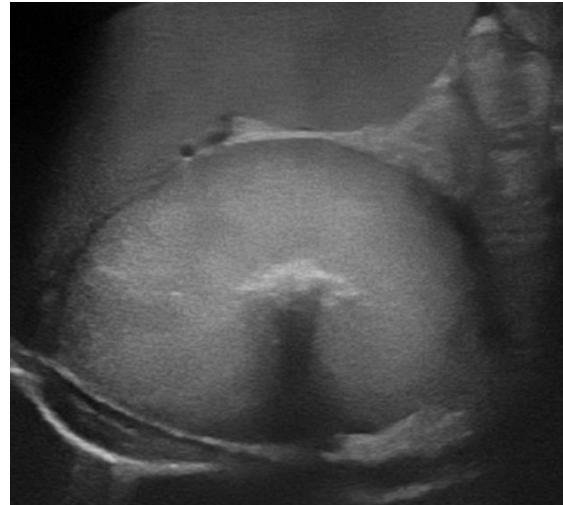
Mass of 'normal' pulmonary tissue with systemic supply, systemic drainage, no connection to the tracheobronchial tree, and a separate pleural covering

It is almost always on the left (~90%) and ~15% of these are located beneath the diaphragm

It usually detected antenatally

More common in males

Case 1, 2 and 3



Adrenal Haemorrhage Imaging

Ultrasound is the modality of choice

- Early: Hyperechoic irregular mass which is flattening the kidney
- With time the lesion gradually becomes cystic
- Usually, the contour of the adrenal gland is preserved
- Late: Usually becomes undetectable but may remain cystic and can calcify

MRI would be the next best modality

- Signal will change according to standard degradation of haemoglobin
- 1-5 days may be low on T1
- 1-5 weeks T1 will be high
- Enhancement will depend on the amount of adrenal gland involved

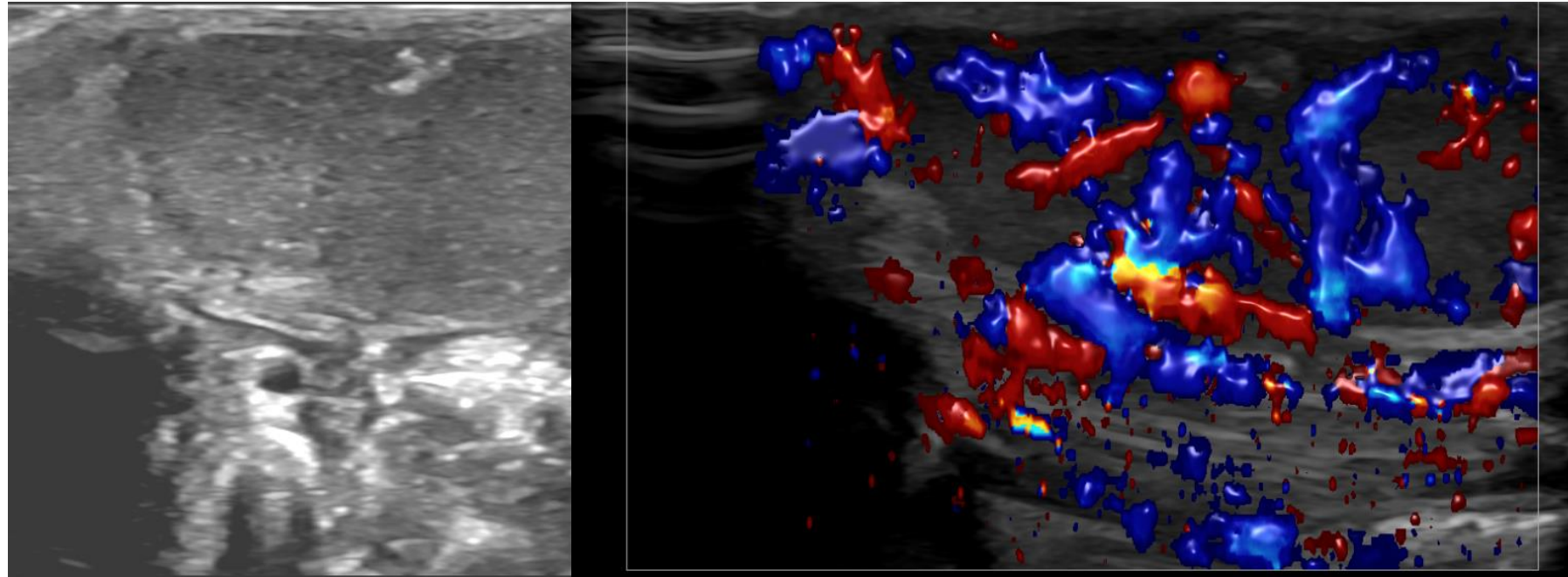
Case 4

2 month old

Bluish lump on foot

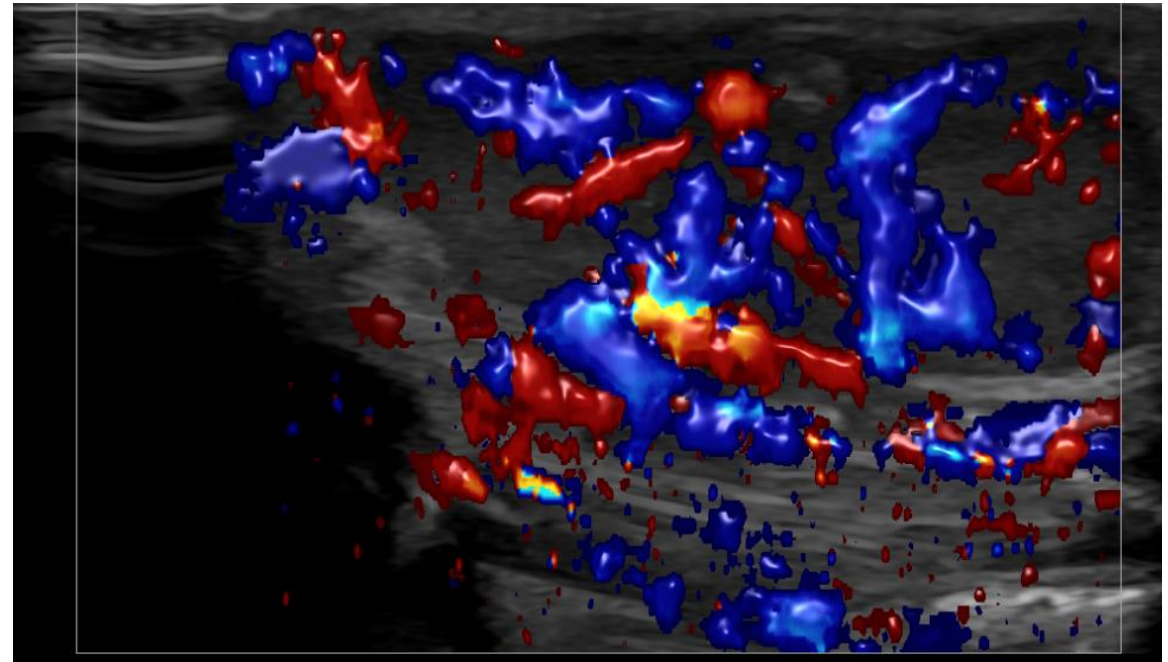
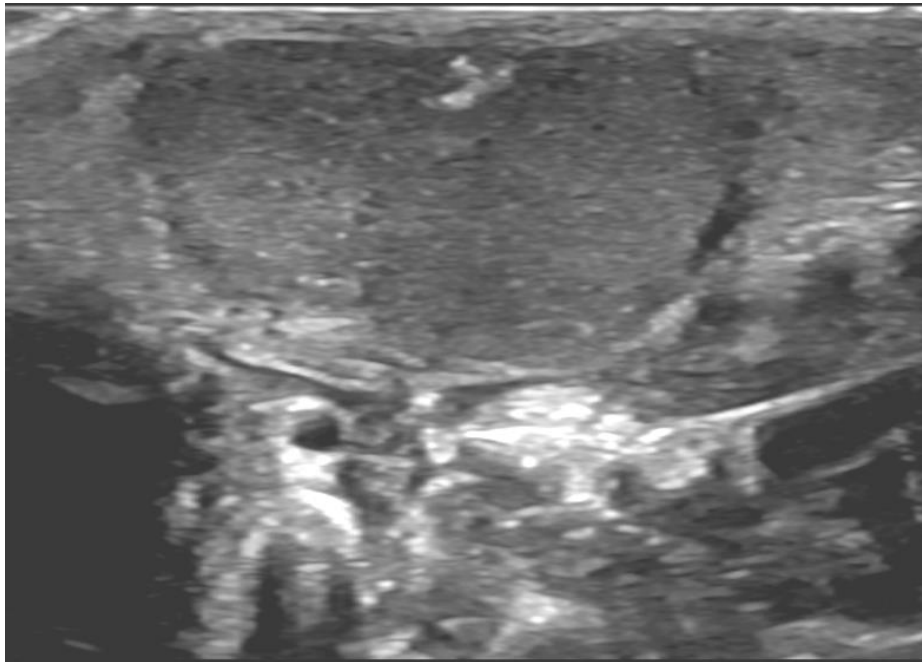
Not present at birth

Growing



Case 4

Infantile haemangioma



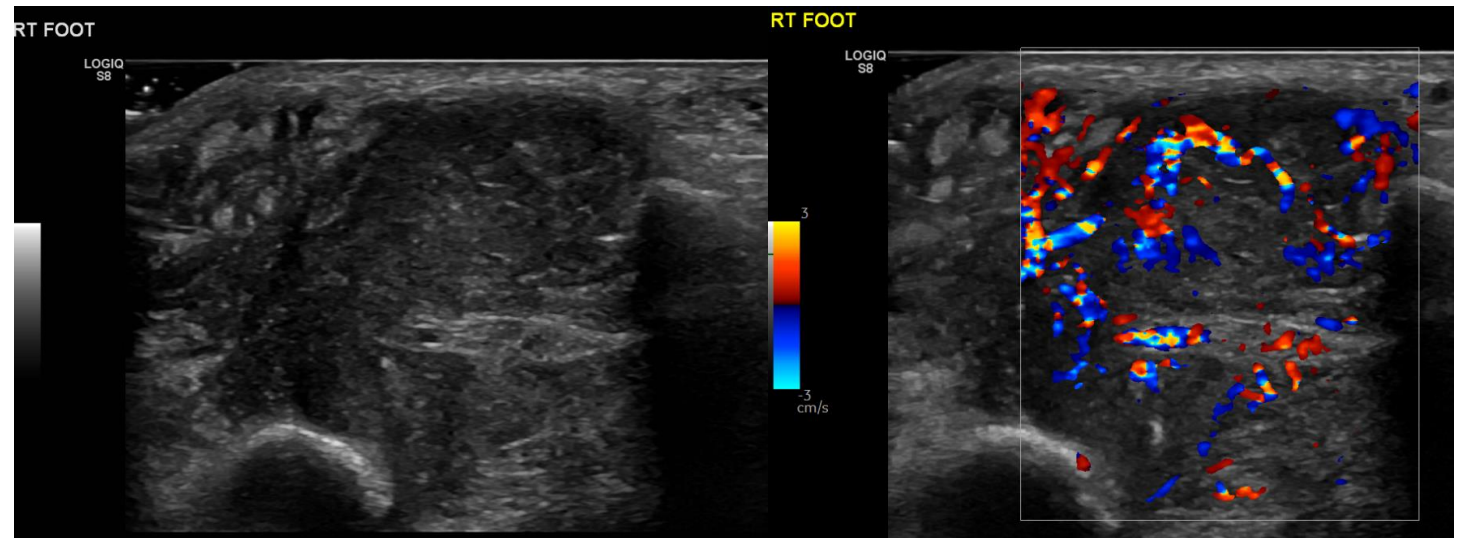
Case 5

9 year old

Bluish lump on foot for 3 months

Non tender

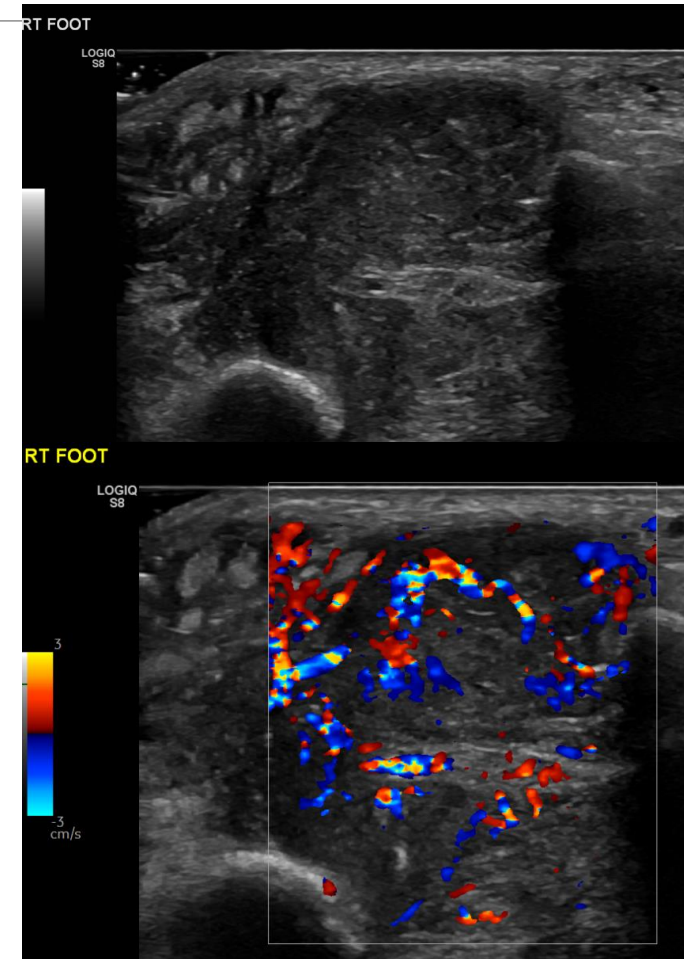
Growing



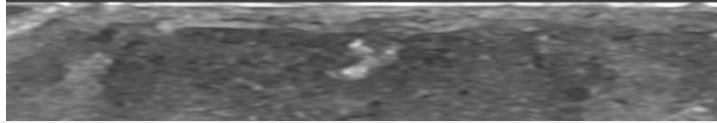
Case 5

Rhabdomyosarcoma

- Malignant tumour of skeletal muscle
- Commonest malignant soft tissue tumour in children
- Usually a rapidly growing lump
- Common in the head and neck region
- On ultrasound these are often highly vascular soft tissue masses



Case 4 and Case 5

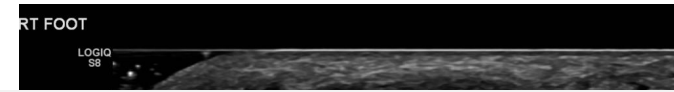
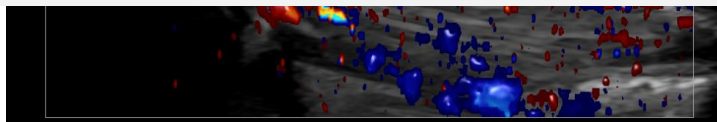


2 month old

Bluish lump on foot

Not present at birth

Growing

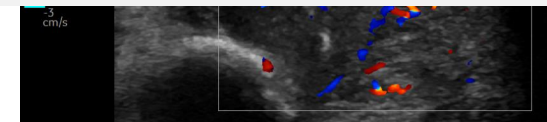


9 year old

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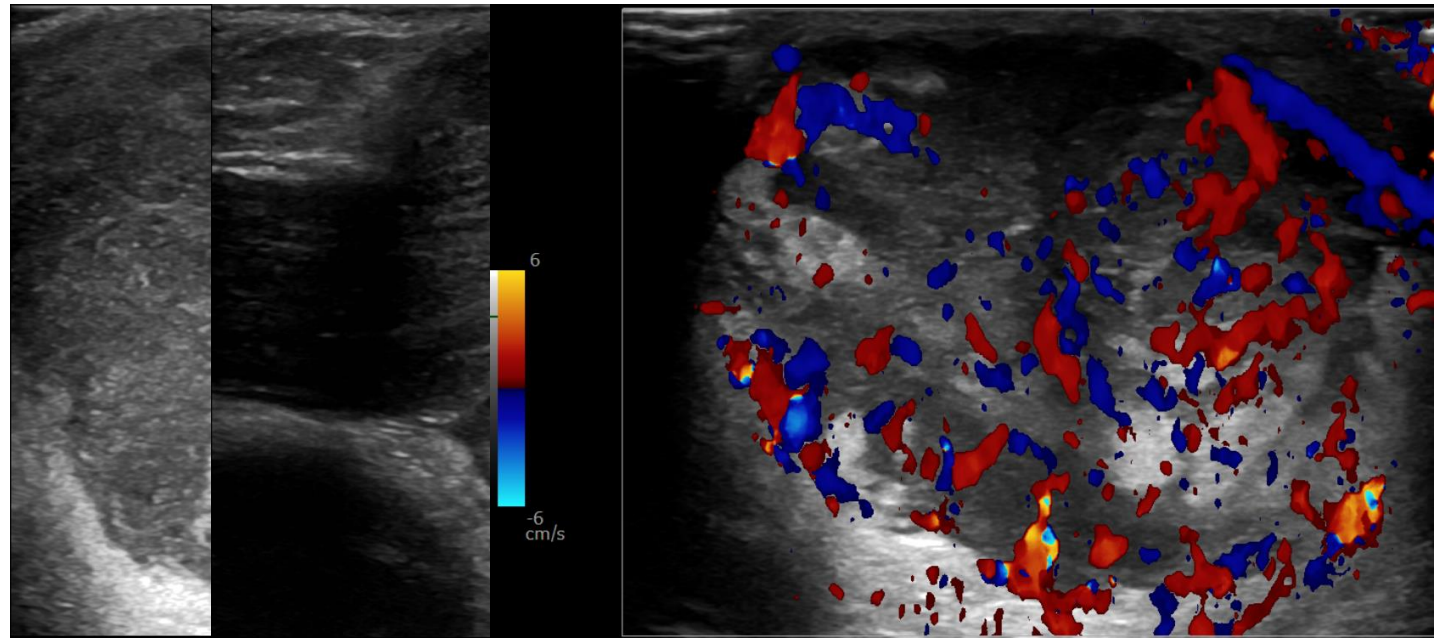
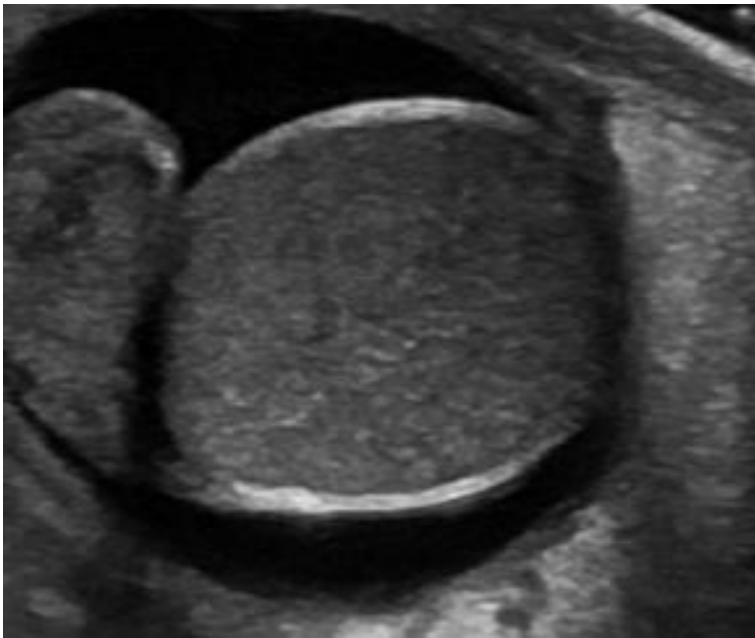
Non tender

Growing

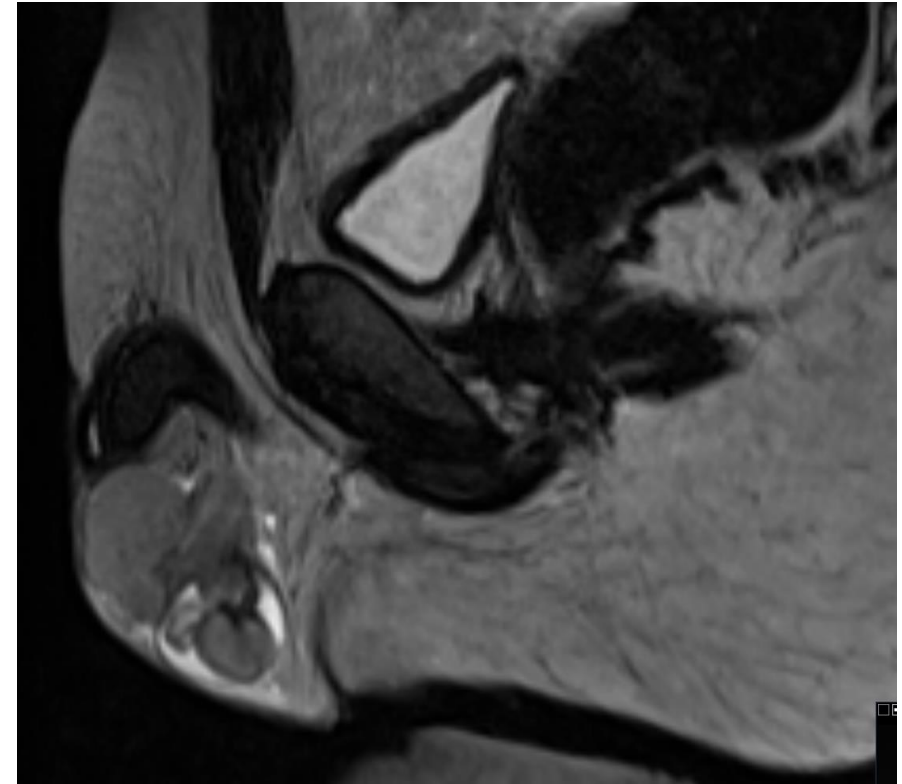
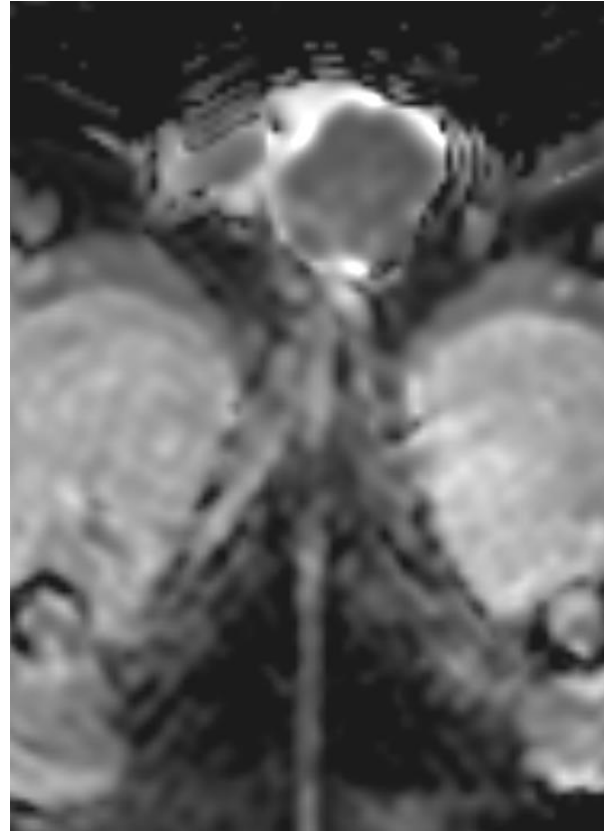
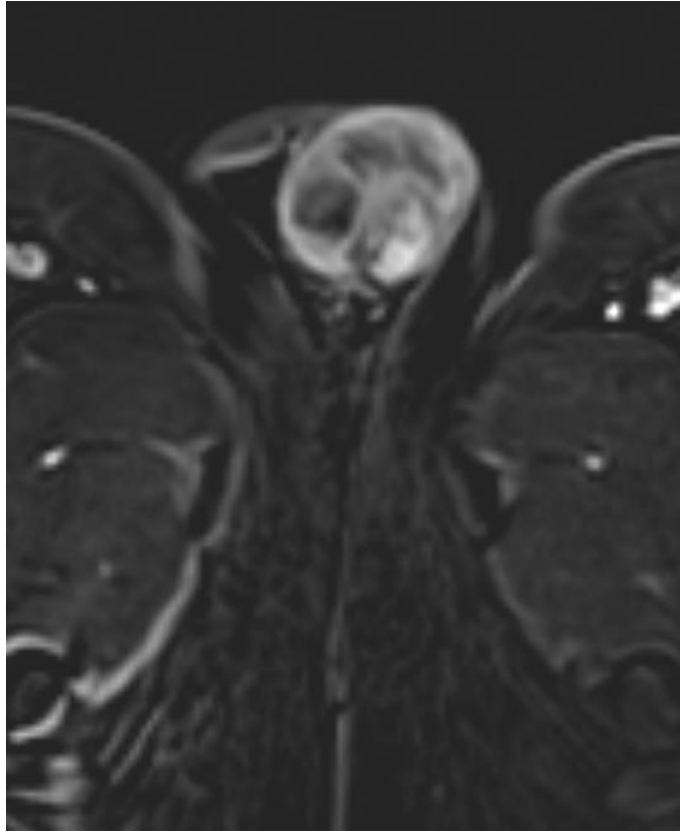


Case 6

- School age boy
- Kicked in groin during sports and now presents with a lump



Case 6



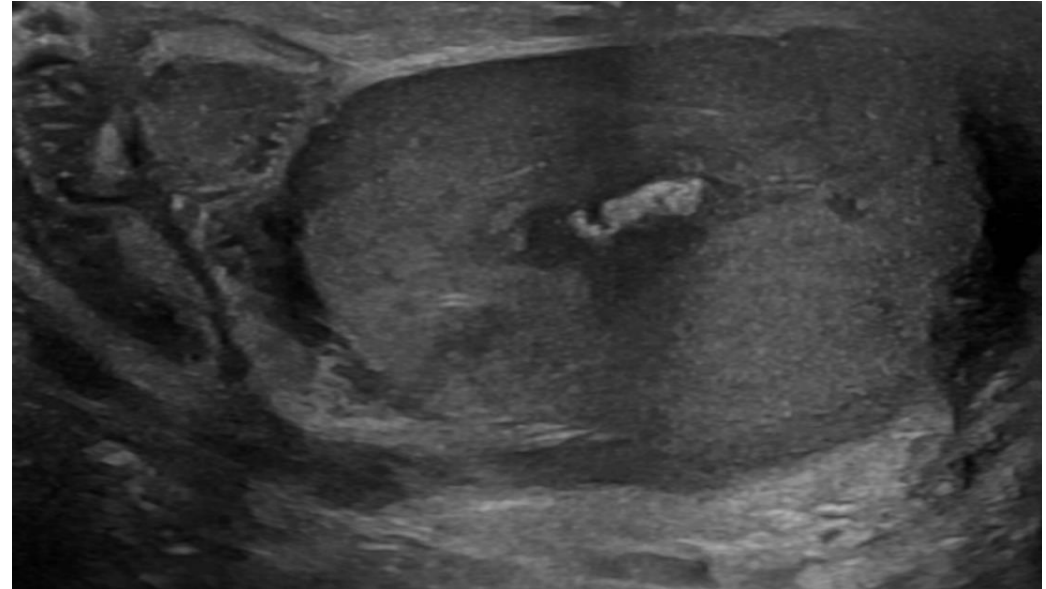
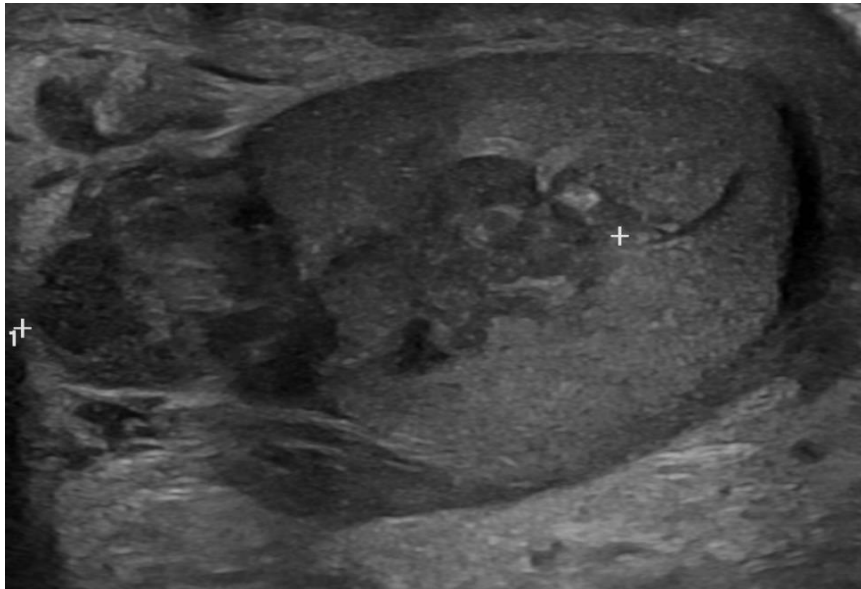
Case 6

Paratesticular Rhabdomyosarcoma

Case 7

Adolescent boy

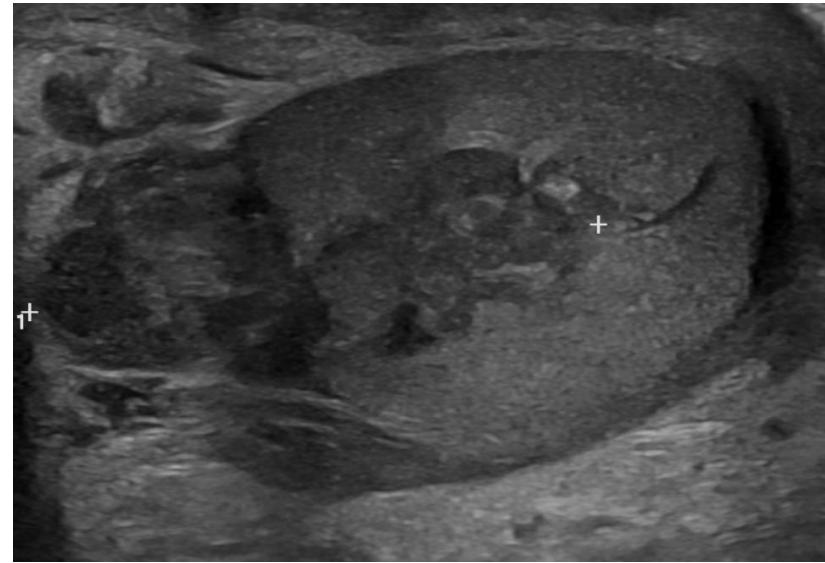
Kicked in the groin during sports and has pain and a lump in the testicle



Case 7

Malignant germ cell tumour

Case 6 and 7



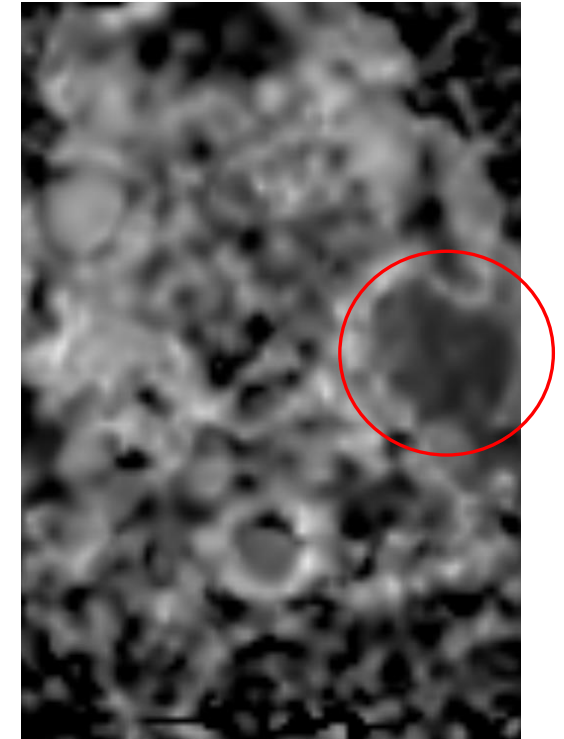
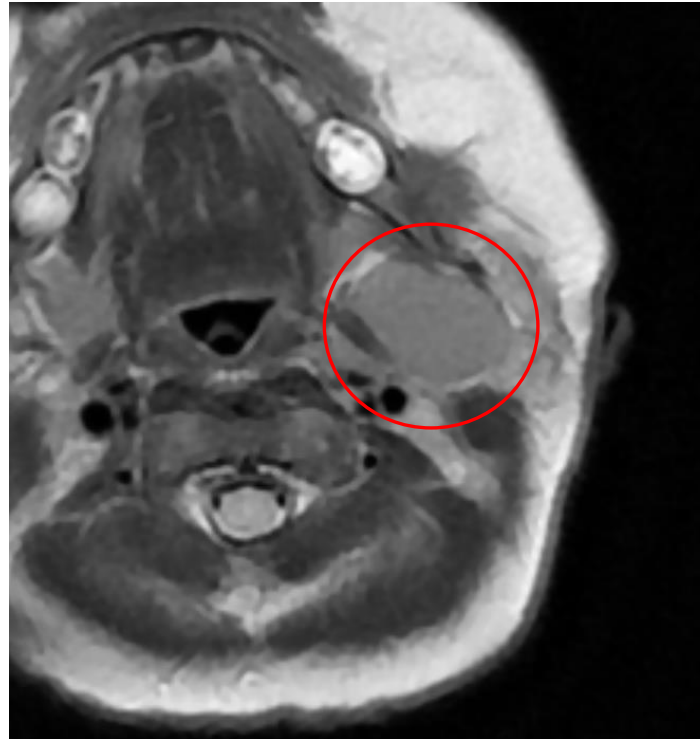
Case 8

5 year old

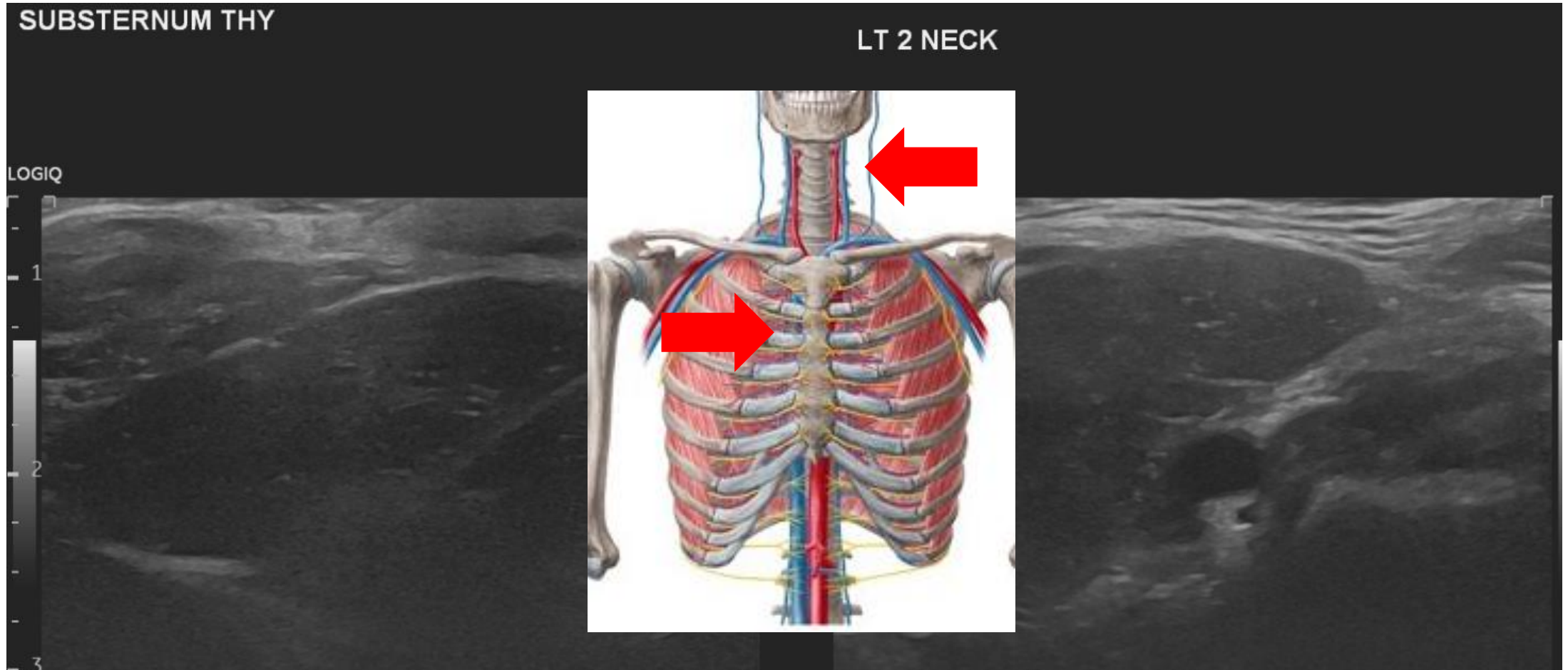
Neck mass seen incidentally
on MRI head being done to
investigate seizures

No symptoms

Soft mass palpable clinically



Case 8 USS



Ectopic thymus

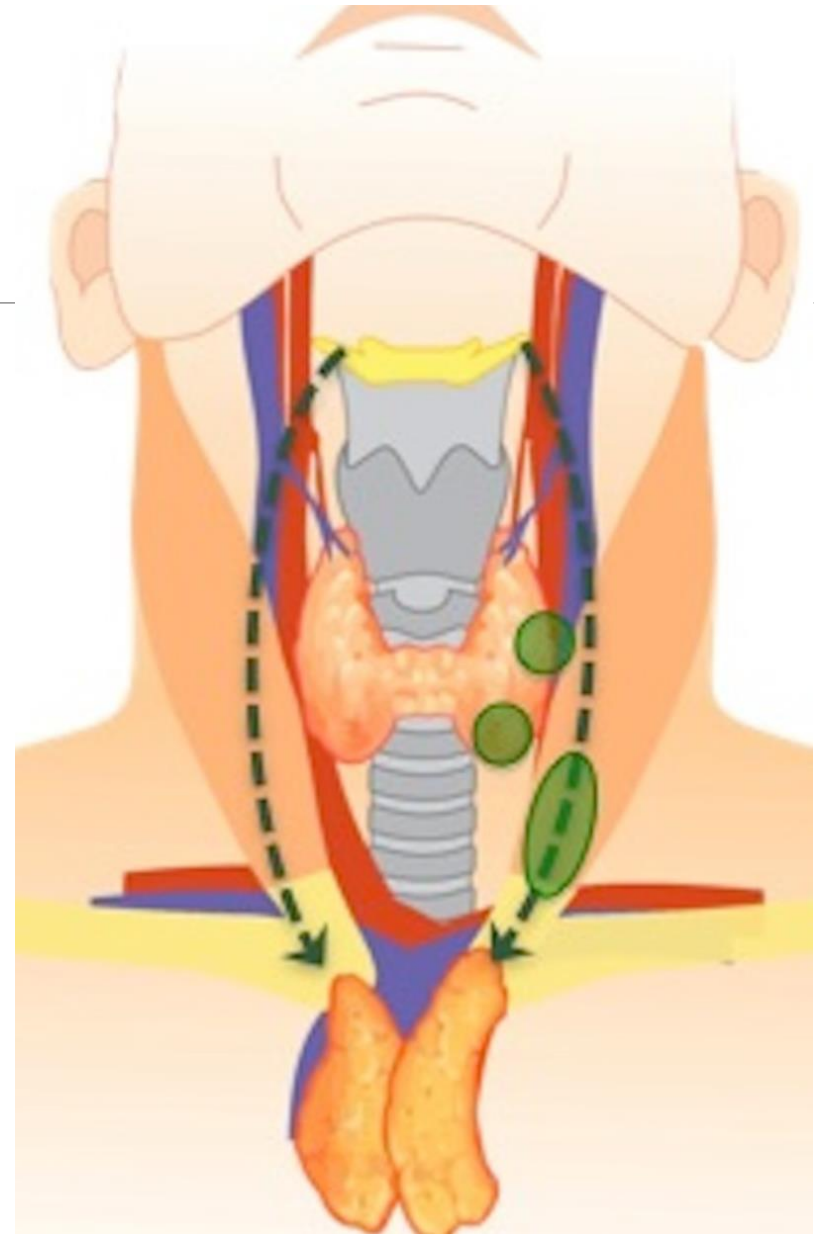
Thymus begins in the 3rd branchial cleft on either side of the neck

Each lobe descends into mediastinum along the thymopharyngeal duct paths

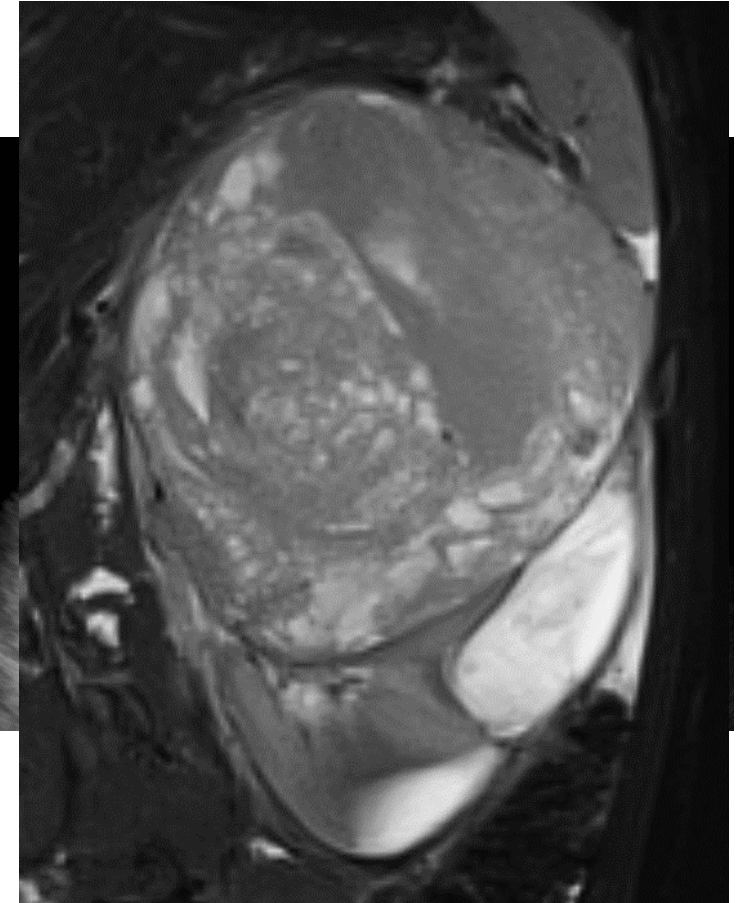
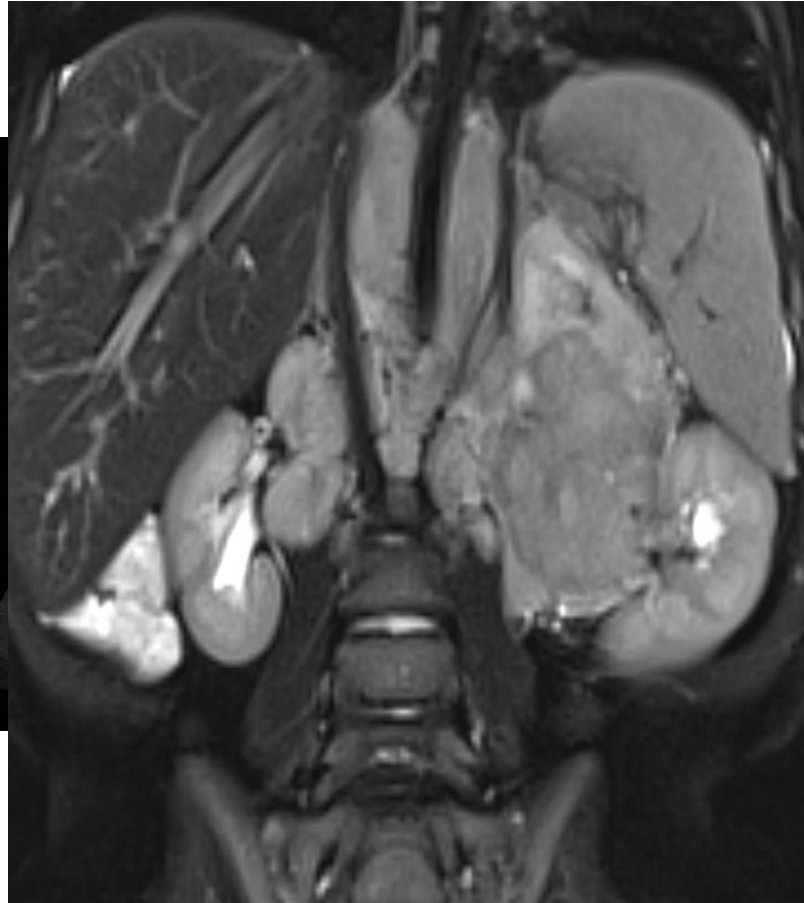
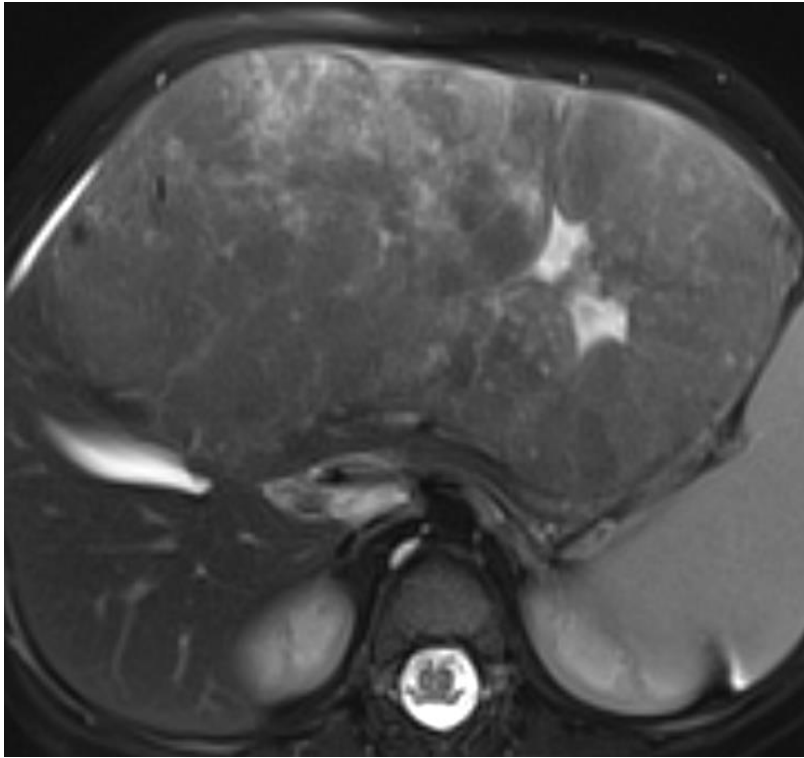
Fuse in the midline in the mediastinum

Ectopic thymic tissue may be seen anywhere along this path

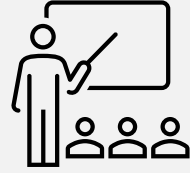
This may or may not be contiguous with the thymus in the chest



In case you were worried



Conclusion



Ultrasound in paediatric oncology is the first imaging modality and often makes the diagnosis or at least provides the information for the next steps



Always have the general principles in mind:

Where is it coming from?
Is there more than one?
Cystic or solid?
What is happening to the main blood vessels in the abdomen



Most importantly, remember that we are not histopathologists...