

# Slowly but Surely – Contrast Enhanced Ultrasound (CEUS) for indeterminate renal lesions.

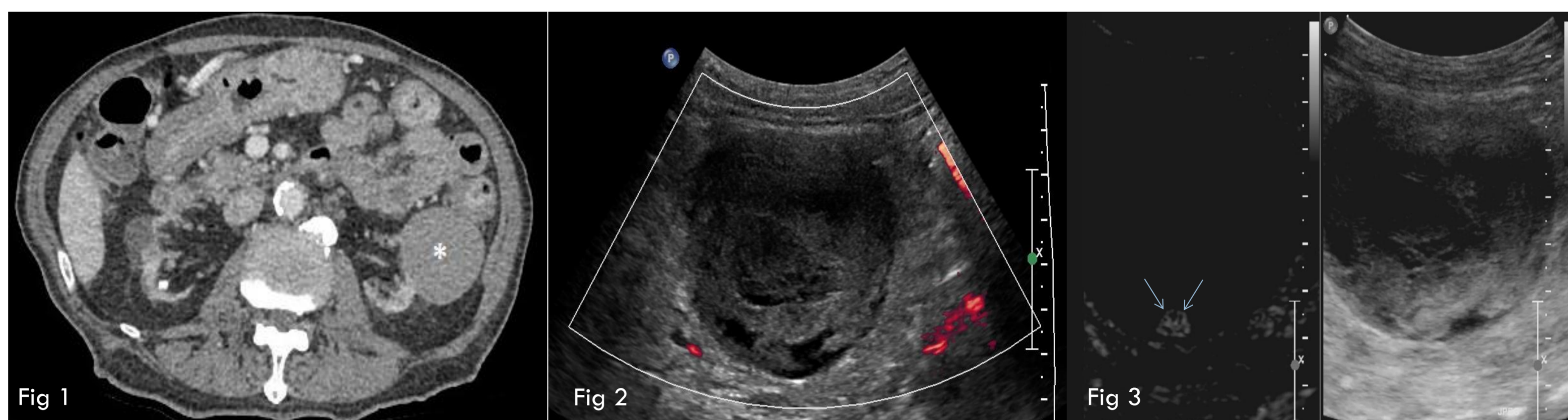
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## Background and Aims

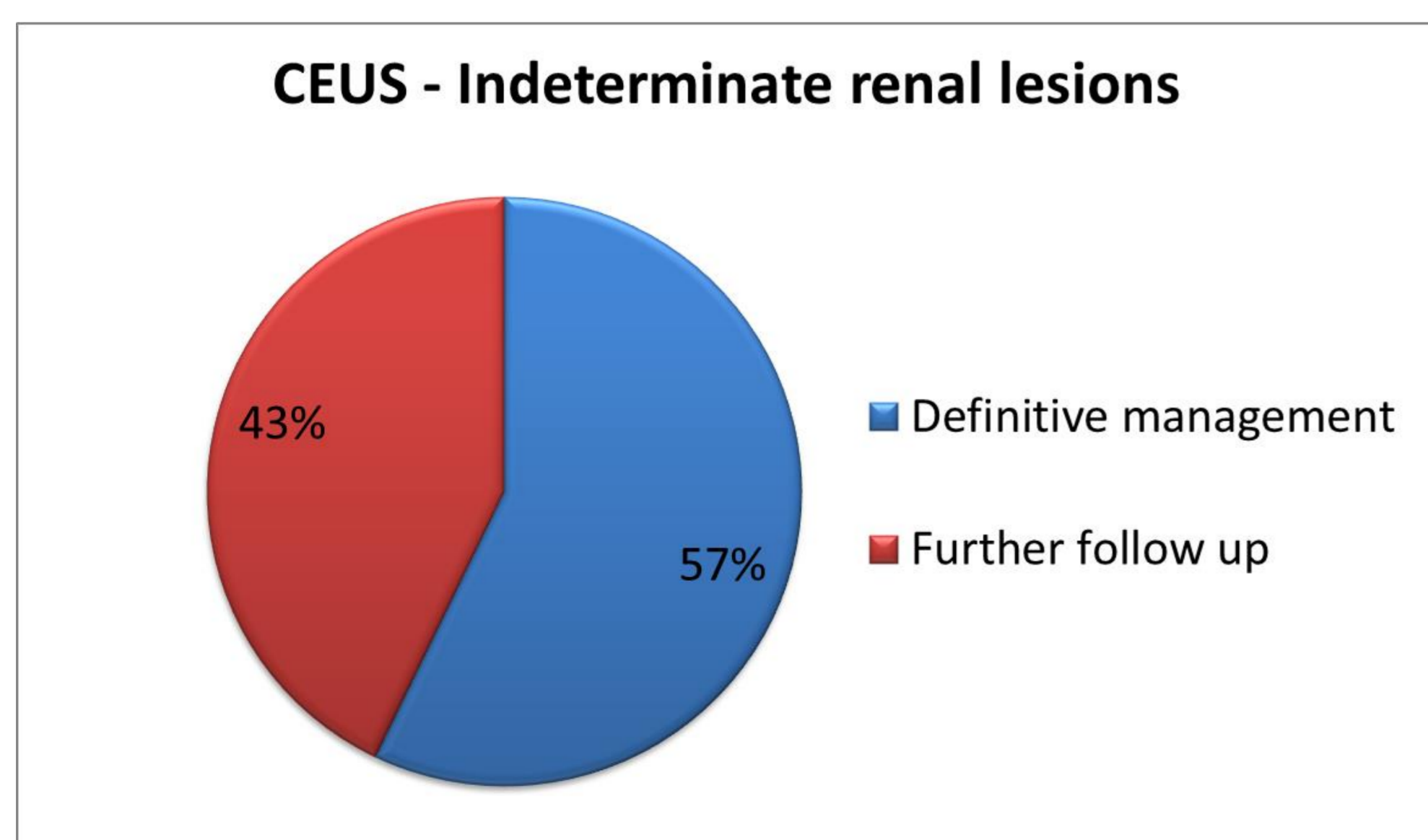
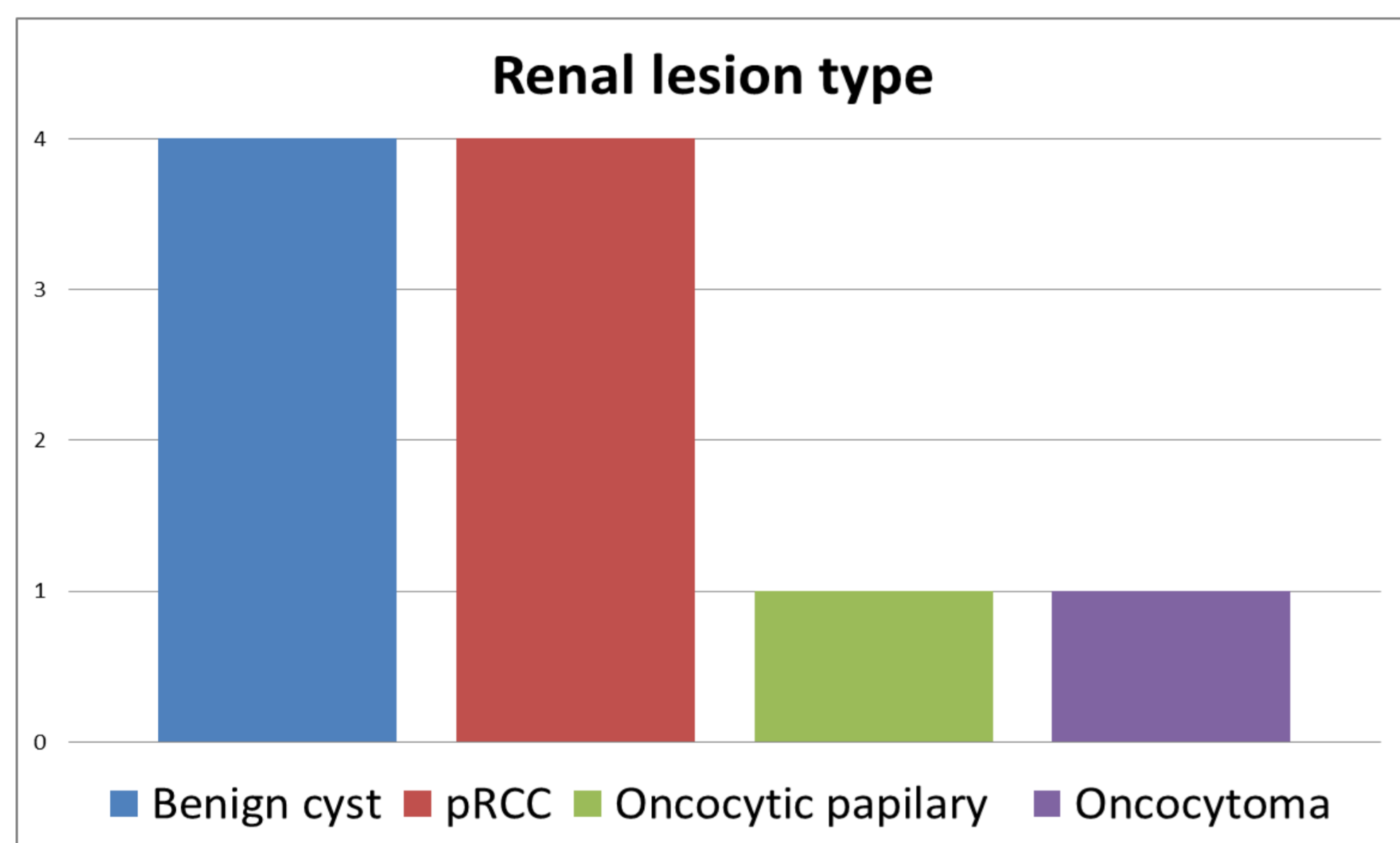
The majority of renal lesions can be confidently evaluated on conventional ultrasound (US) and pre and post contrast computed tomography (CT) or magnetic resonance imaging (MRI). Difficulty in excluding the malignant potential of a subset of renal lesions is often related to equivocal objective assessment of vascularisation assessed by colour flow on US or contrast enhancement on CT/MRI, particularly when attempting to differentiate hypovascular solid lesions from hyperdense cysts. Given the excellent sensitivity in relation to microvascular flow, CEUS has the potential to add further diagnostic clarity for these indeterminate lesions (Tedesco et al, 2018). At our institution CEUS has been reserved for evaluating indeterminate renal lesions on US/CT/MRI or for evaluating renal lesions in patients with significant renal impairment precluding CT or MRI contrast agent administration. It is important to establish the added value of CEUS for those patients undergoing this additional test.

## Methods

A prospective record of patient identification number, demographics, previous imaging, CEUS diagnosis, complications, subsequent histopathology and follow-up was accrued since the introduction of CEUS as a problem-solving tool for assessing indeterminate renal lesions at our institution in November 2017. Evaluation to determine whether CEUS provided additional diagnostic value over conventional imaging was assessed using histopathology, discharge or imaging follow-up schedules as end points.



**Interesting case** - CT (Fig 1) demonstrates an indeterminate high density renal cyst (\*). Conventional US (Fig 2) is advised as follow up which shows a complex cystic lesion with no internal vascularity using power Doppler, with appearances being in keeping a haemorrhagic cyst. CEUS (Fig 3) demonstrates a haemorrhagic cyst (no contrast uptake) with a tiny underlying polypoid tumour demonstrating contrast uptake (arrows) as the cause for bleeding.



## Results/ Discussion

20 patients underwent CEUS to evaluate 21 indeterminate renal lesions from 09/11/2017 – 23/05/2019. All patients were thought to have Bosniak 2F/3 cysts or possibly solid hypo-vascular lesions on prior imaging. The traditional pathway for these patients would result in either image-guided biopsy of the lesion in question or prolonged imaging surveillance (usually with CT) to ensure no interval change. CEUS has been shown to be more sensitive than CT for detecting hypovascular lesions, which is considered the current “gold standard” when imaging renal lesions (Bertolotto et al, 2015). Within our patient group, 8 of 21 lesions were found to be solid hypo-enhancing tumours on CEUS. This corroborates the improved sensitivity of CEUS when compared with traditional imaging methods, which demonstrated either a complete lack of vascular flow or indeterminate features. Histopathology from biopsy and/or resection confirmed four papillary renal cell carcinomas (pRCC), one oncocytic papillary renal tumour and one oncocytoma. One patient demonstrated two enhancing solid lesions, one lesion within a transplant kidney and the other within a native kidney. Unfortunately, confirmatory histopathology was not obtained for these lesions as the patient died of unrelated factors. Four lesions were found not to enhance on CEUS, allowing for discharge. Overall, 12 of 21 lesions (57%) were confidently categorised as either malignant or benign, allowing for definitive management such as surgery or discharge. 9 (43%) lesions were categorised as either Bosniak 2F/3 cysts necessitating imaging follow-up.

## Conclusions

Solid renal tumours diagnosed on CEUS tend to be hypo-vascular pRCC as characteristic (slow but sure) microvascular enhancement has not been detected with conventional imaging. CEUS has demonstrated a valuable role as a problem-solving tool for renal lesions deemed indeterminate on conventional imaging. While CEUS was not able to entirely eliminate the necessity for follow up in all patients, it did reduce the overall follow up rate, guiding whether to biopsy/resect, perform surveillance or discharge patients.

## References

- Bertolotto, M., Cicero, C., Perrone, R., Degrassi, F., Cacciato, F. and Cova, M.A., 2015. Renal masses with equivocal enhancement at CT: characterization with contrast-enhanced ultrasound. *American Journal of Roentgenology*, 204(5), pp.W557-W565.
- Tedesco, G., Sarno, A., Beleù, A., Rizzo, G., Grecchi, A.M., Testa, I., Giannotti, G. and D'Onofrio, M., 2018. Clinical use of abdominal contrast-enhanced ultrasonography (CEUS) beyond liver. *Ultrasonography*.