Evaluation of the utility of point-of-care ultrasound in detecting ureteral obstruction in cats

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Introduction
Ureteral obstruction is a common cause of abdominal pain, azotaemia, anuria and associated life-threatening electrolyte imbalances in cats that appears to be increasing in prevalence (Kyles et al., 2005; Segev et al., 2013). History and clinical signs associated with ureteral obstruction are often non-specific. A tentative diagnosis of ureteral obstruction on ultrasound can be based on the presence of unilateral renomegaly, renal pelvis dilation, proximal dilation of the ureter or visualisation of a ureterolith on ultrasound when performed by board-certified radiologists (Lamb et al., 2018). Whilst previous literature has relied on board-certified radiologists for diagnosis, there is little reported on utility of ultrasonography when performed by non-radiologists.

Aims and Objectives
To evaluate the use of point-of-care ultrasound for detection of ureteral obstruction in azotaemic cats.

Materials and Methods
The electronic medical records of the Queen Mother Hospital for Animals were searched using a computerised search of cats presenting to the emergency and critical care service with a diagnosis of acute kidney injury (AKI) or ureteral obstruction between January 2007 and December 2019.

POCUS criteria used for diagnosis of ureteral obstruction was the presence of one or more of the following:
- Pyellectasia
- Renal asymmetry
- Ureteral dilation
- Visualisation of calculi

Results
One hundred forty cats met the inclusion criteria. Cats with ureteral obstruction (100/140 [71.4%]) were placed in the obstructed azotaemic (OA) group, and cats with acute kidney injury without evidence of ureteral obstruction (40/140 [28.6%]) were placed in the non-obstructed azotaemic (NOA) group.

<table>
<thead>
<tr>
<th>POCUS Findings</th>
<th>Obstructed (n = 100)</th>
<th>Non-Obstructed (n = 40)</th>
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</thead>
<tbody>
<tr>
<td>Pyellectasia</td>
<td>72 (72)</td>
<td>3 (7.5)</td>
</tr>
<tr>
<td>Gross renal asymmetry</td>
<td>29 (29)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Ureteral dilation</td>
<td>24 (24)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Visualisation of calculi</td>
<td>11 (11)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Discussion
Veterinary POCUS performed similarly to human emergency doctor POCUS which has previously been reported to have a sensitivity of 85.7% and specificity of 69.5% for diagnosis of ureteral obstruction when compared to formal ultrasound (Pathan, 2018). The most common POCUS finding in our study was pyellectasia, in line with previous human literature on ureteral obstruction whereby hydronephrosis is considered the most specific indicator of ureteral obstruction on POCUS (Wong, 2018; Southgate, 2020).

Conclusion
Renal POCUS had a high specificity and positive predictive value demonstrating the utility of POCUS in expediting further diagnostics to minimise ongoing renal injury. Absence of POCUS findings does not rule out ureteral obstruction, and further renal imaging is warranted if clinically indicated.

References

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