**Kidney Ultrasound Tracing Annotation Instructions**

**STEPS**

1. RATE the ultrasound image for QUALITY on a scale of
   1. **UNSATISFACTORY** – no kidney in view
   2. **POOR** – kidney in view, structures are not traceable
   3. **FAIR** – kidney in view, some structures are traceable, some settings are optimized, adequate for interpretation;
   4. **GOOD –** kidney in view, most/all structures are traceable, settings are optimal for the kidney, excellent for interpretation; represents an ideal or close-to ideal ultrasound image
2. LABEL the VIEW as one of
   1. **TRANSVERSE**
   2. **LONGITUDINAL**
   3. **OTHER**
3. If the image is of **FAIR** or **GOOD** quality, proceed to step 4. Else proceed to step 5.
4. TRACE the following ANATOMY (in order of decreasing importance)
   1. **Cortex**
   2. **Capsule**
   3. **Medulla**
   4. **Central Echo Complex** (includes calyces, renal sinus, fat in renal sinus and renal pelvis – this is the conglomeration of echoes in the centre of the image)
5. ENTER any COMMENTS thought to be pertinent.
6. CONTINUE to the next image.

**GUIDELINES**

* Only trace anatomical areas you feel certain about.
* Infer margins when comfortable doing so.
* Connect the capsule tracing across the renal pelvis.
* Trace partial portions of the cortex and medulla.
* Trace images even if a portion of the kidney is not seen on the image. This would require a straight line on the trace.
  + Ex: A portion of the kidney is outside of the ultrasound field of view, but the image is otherwise fair quality. The tracing would be a straight line down the extent.
* Shorthand in the comments is entirely acceptable!
* Intra-rater variability will be captured by having 10 random duplicate images.
* Inter-rater variability exists and that is entirely okay!

**Notes**

*On the Data*

* Abnormal and normal, as well as native and transplanted kidneys were included.
* Using a PACS viewer, the descriptions were vetted for anything that contained “renal”, “renal tx” or a variant of that. This includes general abdominal scans.
* Most images are obtained from the last five years.
* Manually removed any images that were not the kidney.
* Randomly selected a single kidney image from each patient to provide to the annotators

*On the annotations*

* First 10 images took 90minutes of work, ranging from 5 to 16 minutes each
* Cityscapes Dataset’s Fine Annotations were given as a reference for annotators on polygon fineness
* Annotators were instructed **not** to include the connective tissue that constitute the column of Bertin as the renal cortex.
* The renal capsule should be traced on the line where the pixel is part of the kidney.

*On the image quality*

* Quality of the renal images is fair and not as great as they could be. Many where we aren’t able to segment the whole kidney in the image, or trace the medulla and cortex around the entire kidney
* Sonographers are doubtful there are GOOD quality images. Sonographers comment that the image quality being marked as fair is if they’re able to trace the kidney capsule at least. If they could trace anything in the image, then it’s either fair or good. However, this is different than the real-world definition of quality, as many of the fair images would be unacceptable as a scan of the kidney.

Diagram

Description automatically generated