

CCK Ultrasound

For the past fifteen years we have used the CCK Cholecystogram Stimulation Test performed in the erect position for the diagnosis of a dysfunctional gallbladder. The method that was used is described in the Appendix Section of The FAT Book and was written by Dr. Juan Gaia of the Valley Open MRI and Diagnostic Center in Kingston, Pennsylvania.

The oral medications, Telepaque and Bilopaque are no longer being produced commercially. It was necessary to find another method to measure the function of the gallbladder. Nuclear medicine provides one means of measuring the output but the patient could only be studied in the supine position. Ultrasonography was used early on but lost favor because the volume of the gallbladder could not be adequately measured. Today, the ability to accurately measure the volume of the gallbladder pre and post-injection of cholecystokinin coupled with the ability of the patient to be studied in the erect or standing position makes ultrasound the method of choice for me.

The method of using ultrasound to determine the ejection fraction of the gallbladder is straight forward and can be duplicated wherever ultrasound is performed.

An erect CCK ultrasound study should be performed following an 8-to-12 hour fast. The highest frequency transducer that could satisfactorily visualize the gallbladder should be utilized. The scanning technique varies from patient to patient depending on body habitus and anatomic position of the gallbladder. The patient is placed in a supine position first to measure the gallbladder volume. Most ultrasound equipment has the ability to calculate volume. However, the formula $V=.52 (L \times W \times H)$ may be used.

The gallbladder volume is then calculated with the patient in the erect position. The patient will remain in the erect position for the duration of the study. Following the administration of CCK, a five minute post volume is calculated. The study is concluded with a fifteen minute delay volume calculation .

Symptoms occurring during the test are recorded, especially one of pain or reproduction of the symptoms.

The equipment we are familiar with are the GE Logic 9 and the Siemens

Antares. Transducer frequencies should include 2.5-5 MHZ. The highest frequency must be used for increased resolution of the gallbladder, depending on patient body habitus for depth.

Previous gallbladder ultrasound must be performed for comparison to ensure absence of calculi or polyps. If no previous films were obtained a gallbladder ultrasound must be performed prior to the CCK study. In the event that calculi or polyps are visualized the ordering physician should be contacted.

Patient's weight must be obtained to ensure proper dosage of CCK.

Procedure Protocol

Longitudinal and transverse images of the gallbladder in its maximum dimension, in the supine and erect position, are obtained using the digital screen function to calculate pre-injection volume.

The radiologist will inject the CCK over a period of five minutes, 1cc every thirty seconds, the dosage determined by the weight of the patient.

Five and fifteen minutes from the injection time, longitudinal and transverse images of the gallbladder are obtained in the supine and erect positions using dual screen technology.

The patients should remain erect in between imaging sequences. Ambulatory patients should walk around or stand between scanning times.

Images of the gallbladder are obtained in the erect position using dual screen technology at five and fifteen minutes post-injection..

Interpretation Criteria:

Gallbladder ejection fraction > 45% is considered a normal exam. Any value less than that should be considered abnormal. Also, the reproduction of pain or similar symptoms is considered a positive test which signifies a dysfunctional gallbladder and should be removed surgically.

Documentation:

Technological Impression:

Sonographer technical impressions are completed electronically for radiologist interpretation. All symptoms the patient experiences (pain, cramping, nausea, vomiting, or any additional symptoms) must be documented in the technical impression.

The time of the symptomatic event must be documented in the technical impression. Gallbladder post-injection volume is calculated and documented on the technical impression.

CCK Dosage

45kg=1.0mcg

55kg=1.1mcg

66kg=1.3mcg

70kg=1.4mcg

75kg=1.5mcg

80kg=1.6mcg

100kg=2.0mcg

125kg=2.5mcg

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