

SSG10-06

Cracking the Case on "Knuckle Cracking": The Sonographic Evidence

Tuesday 11:20-11:30 AM | SSG10-06 | NA

#### PURPOSE

1] Report the static and dynamic appearance of knuckle cracking (KC) with sonography (US) and 2] analyze the performance of US for the diagnosis of KC.

#### METHOD AND MATERIALS

A prospective, IRB-approved study was performed on healthy adult subjects with and without a history of habitual KC. Exclusion criteria were a history of pain or arthritis in the hands. Recorded clinical history included KC events per day multiplied by the number of KC years (allowing the calculation of "crack-years") and a QuickDASH questionnaire. Physical examination, including grip strength and Beighton scoring, was performed by two subspecialty orthopaedists blinded to subject KC history. US (with temporal resolution of 87 frames/sec) was conducted by a single sonographer, with static and cine images recorded before, during, and after metacarpophalangeal joint (MPJ) distraction was performed by the subjects. Two blinded musculoskeletal radiologists interpreted the images for a definite hyperechoic focus during and after MPJ distraction (not present prior to distraction); this was compared against the reference standard of an audible "crack" during joint distraction.

#### RESULTS

We studied 400 MPJs of 40 subjects (17 women, 23 men), with mean age of 33 years (range, 18-63). In comparing 10 non-KC subjects (with 0 "crack-years") versus 30 KC subjects (with "crack-years" ranging from 16 to 800), there was no significant difference in sex, age, QuickDASH score, grip strength, or Beighton score. In 62 of the 400 MPJs, there was an audible "crack" during manual distraction. Range of motion was noted to significantly increase in these 62 MPJs with respect to active and passive flexion, and passive extension between pre and post KC ( $p < 0.05$ ). With US, blinded readers had a good sensitivity (R1, 75%; R2, 80%) and excellent specificity (R1, 94%; R2, 95%), with a very good inter-observer reliability of 0.87 ( $p < 0.0005$ ). A brilliant hyperechoic flash that was simultaneous with the KC event and arose over approximately 115 msec was highly characteristic.

#### CONCLUSION

US examination during movement of the MPJs can show distinctive findings of KC with relatively high specificity and inter-observer reliability. US features corroborate the theory of cavitation as the etiology for sound generation in voluntary KC.

#### CLINICAL RELEVANCE/APPLICATION

Audible emissions may be associated with a broad array of (intraarticular and extraarticular) clinical conditions, but KC has a characteristic US appearance.

FIGURE (OPTIONAL)

[http://abstract.rsna.org/uploads/2015/15015811/15015811\\_kskh.jpg](http://abstract.rsna.org/uploads/2015/15015811/15015811_kskh.jpg)