Background: Cheilectomy is a common surgical procedure for the treatment of stage 1 and 2 hallux rigidus. However there is limited scientific information on its functional results. The purpose of this study was to objectively evaluate the effects of cheilectomy on gait at one year after surgery.

Methods: Seventeen patients with symptomatic stage 1 or stage 2 hallux rigidus refractory to conservative treatment were studied. Pre- and post-operative 1st MTP range of motion and AOFAS hallux scores were recorded. A three dimensional gait analysis was performed within four weeks prior to surgery and then repeated at a minimum of one year after surgery. Kinematic and temporal-spatial parameters were collected using a 5-camera Motion Analysis System (Motion Analysis Corporation Inc., Santa Rosa, CA). Reflective markers were secured to anatomic locations using the Helen Hayes marker configuration. Ground reactive force data was recorded by an AMTI OR6-5 force platform (Advanced Medical Technology, Inc., Newton, MA) that was embedded in the center of an 8 meter walkway. Inverse dynamics was used to derive kinetic information from the kinematic and ground reactive force data. Temporal-spatial parameters collected included velocity, stride length, step width, and single limb support time. Kinematic and kinetic parameters examined included sagittal plane ankle range of motion during the gait cycle and maximum sagittal plane ankle push-off power, respectively.

Results: Significant increases were noted for 1st MTP range of motion and AOFAS hallux score. 1st MTP motion improved on average 18.1 degrees, from a mean of 28.4 degrees pre-operatively, to 46.5 degrees post-operatively. AOFAS hallux score increased from 60.8 degrees to 76.3. Gait analysis results showed significant increase in post-operative maximum ankle power, compared to pre-op. The kinetic analysis demonstrated a significant increase in maximum ankle push-off power from $1.7 \pm 0.7$ W pre-operatively to $2.1 \pm 0.5$ W after surgery ($p < 0.05$). There were no significant changes noted for velocity, stride length, step width, single limb support time, or ankle range of motion.

Conclusions: First metatarsal-phalangeal joint cheilectomy for hallux rigidus objectively increases range of motion of the first MTP joint clinically, and improves function as measured by the AOFAS hallux score. Gait analysis demonstrated objective improvement in the function of gait and the ability of the patient to weight-bear and toe-off using the hallux as measured by increase ankle power.