Posterior Ankle Impingement: It is Not All About the *Os Trigonum*

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INTRODUCTION: Posterior ankle and hindfoot arthroscopy (PAHA) is a well described procedure used for treating posterior ankle impingement syndrome (PAIS). *Os trigonum* and trigonal process (Stieda) are common etiologies and diagnosis is typically made by radiographs, CT, or MRI. However, these static tests may not detect associated soft tissue and other bony pathologies, which are often dynamic. Physical examination and Ultrasound (US) are dynamic. US can be limited by depth. Traditional open treatment may not allow visualization and appreciation for these associated pathologies. PAHA is dynamic providing at least 8X magnification with full visualization of the posterior ankle and subtalar joints. The primary aim of this study is to report the incidence of associated pathologies seen with *os trigonum* or Stieda impingement when treated with PAHA.

METHODS:

A retrospective case series of patients who underwent PAHA for PAIS due to trigonal impingement between January 2011 and September 2016 were reviewed. Surgeries were performed by three fellowship-trained orthopedic foot and ankle surgeons in 251 patients. Exclusions were those having concomitant open posterior procedures, other indications for PAHA (e.g., OCL, subtalar fusion) or other PAIS etiology (e.g., soft tissue impingement). After exclusions, 112 patients were studied, with a mean age of 30.5 (12-70) and a BMI of 29.93 (SD 9.23). Demographic data was collected along with pre and postoperative diagnosis, arthroscopic findings, type of impingement, location of the disorder, associated procedures, and anatomical etiologies. Trigonal impingements were allocated as *os trigonal* or Stieda and subgrouped as isolated, with other impingement lesions +/- FHL disorders. Differences between groups with isolated trigonal impingement and those with associated pathologies were determined by distribution comparison. Wilcoxon test was used to compare subgroups.

RESULTS: From the 112 cases, 75 were *os trigonum* and 37 Stieda. Isolated trigonal disorders accounted for 16% of the total PAIS patients (n=18). Those cases having pathologies other than trigonal impingement had a mode of 3 (1-5) additional pathologies with 41% of the treated cases having 3 or more adjunctive findings needing treatment during posterior arthroscopy. Flexor hallucis longus (FHL) disorders was found in 68% of cases, subtalar problems in 44% and transverse posterior inferior tibiofibular ligament (tPITFL) in 19%. A 58% proportion of associated pathologies was observed when FHL disorders were not considered. Significant differences were noted when comparing *os trigonum* and Stieda subgroups (FHL: 29% to 18%, $p<0.001$; FHL and others: 34% to 59%, $p=0.046$; other findings: 14% to 16%, $p=0.025$).

DISCUSSION AND CONCLUSION: Our study described a high prevalence of associated pathological structures involved with a trigonal disorder leading to PAI in a large cohort. Trigonal bone (*os trigonum* or Stieda) was found to cause impingement in isolation in a small proportion of cases (16%). Even when the FHL is removed from the equation, 58% of the total patients still presented other associated impingement pathologies. This should alert surgeons when considering removing trigonal impingement especially with an open approach. Open approaches may limit the visualization and assessment of associated posterior ankle and subtalar pathoanatomy, thus possibly overlooking concomitant causes of PAIS.