Revision Surgery after Failed Index Synthetic Cartilage Implant Resurfacing for Hallux Rigidus
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INTRODUCTION:
Hallux rigidus (HR) of the first metatarsophalangeal joint (MTPJ) is a prevalent arthritic disease which causes pain and stiffness. While MTPJ arthrodesis is regarded as the gold standard treatment option for late-stage HR, synthetic cartilage implant (SCI) resurfacing has gained popularity since it demonstrates similar biomechanical properties as native cartilage, eliminates pain, and preserves MTPJ motion. However, recent studies have reported variable failure rates on SCI treatment, with implant subsidence most commonly leading to a revision. The purpose of this study was to identify the SCI resurfacing failure rate by a single surgeon, while also comparing clinical outcomes of patients who underwent SCI replacement or MTPJ arthrodesis after failed index SCI resurfacing.

METHODS:
Electronic health records were queried from 2016 to 2021 for patients who were experiencing symptomatic late-stage HR and were treated with SCI by a single surgeon. Patient demographics, body mass index (BMI), medical comorbidities, American Society for Anesthesiologists (ASA) physical status, past surgical history, and follow-up periods were recorded. Preoperative and postoperative range of motion, visual analog scale (VAS) pain scores, hallux valgus (HV) angles, and x-ray imaging were compared. Subgroup analysis was performed on patients who underwent revision with either a SCI replacement or MTPJ arthrodesis. SCI replacement included the use of bone graft and/or a custom 3D-printed baseplate to prevent implant subsidence. Descriptive and univariate statistics were used to analyze data.

RESULTS:
A total of 203 SCI resurfacing procedures were performed by a single surgeon, including 23 revisions. When only analyzing index procedures, a revision rate of 8.2% was determined. The revision cohort (n=23) consisted of 19 females, and presented with a mean BMI of 29.5±5 Kg/m², mean age of 52.8±11 years, and mean follow up of 22.3 (range, 3-54) months. Patients underwent revision surgery at an average of 12.1±12 (range, 1-50) months after index SCI resurfacing. Specifically, 12 procedures resulted in an SCI replacement, while 11 procedures resulted in arthrodesis. There was significantly lower postoperative pain VAS (P=0.04) and a significant improvement from preoperative to postoperative pain VAS for the arthrodesis cohort (P<0.001) (Table 1).

DISCUSSION AND CONCLUSION:
Only 8.2% of index SCI resurfacing procedures performed by a single surgeon resulted in failure. When revising a failed index SCI resurfacing procedure, MTPJ arthrodesis was found to reduce pain more significantly compared to SCI replacement procedures. Future prospective studies should be performed to expand upon the limited clinical outcomes data comparing SCI revision procedures such as joint arthrodesis and SCI replacement.