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Authors
Sinha, Aditi
Kheradvar, Arash

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FULL ACCESS | ABSTRACT

INTERVENTION AND SURGERY
SESSION TITLE: PERCUTANEOUS NON-CORONARY CARDIAC INTERVENTION II

Abstract 17659: Leaflet Calcification and Matrix Damage Due to Transcatheter Heart Valve Crimping

Aditi Sinha and Arash Kheradvar

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Abstract

Introduction: Previous studies suggest that crimping causes permanent structural damage to the leaflet tissues of transcatheter heart valves (THV). However, this damage is not yet known to facilitate calcification process.

Hypothesis: Our hypothesis is to test whether crimp-induced damage promotes valvular calcification.

Methods: Self-expandable THVs with Glutaraldehye-fixed bovine pericardial leaflets was used. The valves were divided into two groups; crimped and uncrimped, and each group was split into two to be exposed either to a calcifying solution or to a control -normal phosphate buffered saline- solution. For the crimped group, the valves were carefully crimped with a standard crimper at 14Fr and held crimped for 20 minutes. The calcifying solution contains ionic concentrations corresponding to normal human plasma. All groups were maintained at pH 7.5, 37°C, on an orbital shaker at 400 rpm for 7 weeks. At the end, each tissue sample was individually embedded, sectioned and stained for calcium stain (Von Kossa), Verhoff's Van Geison (VVG) stain for elastin and collagen stain (trichrome III).

Results: Fig 1A show the normal bovine pericardium with arranged collagen layers in blue whereas intermittent striations are seen across the collagen fibers in the crimped group (Fig 1B). VVG stains show similar results with continuous elastin fibers (black) in the uncrimped group (Fig 1C) versus fragmented elastin fibers in the crimped group (Fig 1D). Of most significance are the results from the von kossa stains where crimped samples in saline show minimal hydroxyapatite deposition (Fig 1E) while crimped samples in calcifying buffer show brown deposits of hydroxyapatite along the crimped regions (Fig 1F). No hydroxyapatite deposition was observed in uncrimped group exposed to calcifying solution.

Conclusions: Our results indicate that severe structural changes due to crimping are associated with greater levels of calcium deposition along the crimped sites.

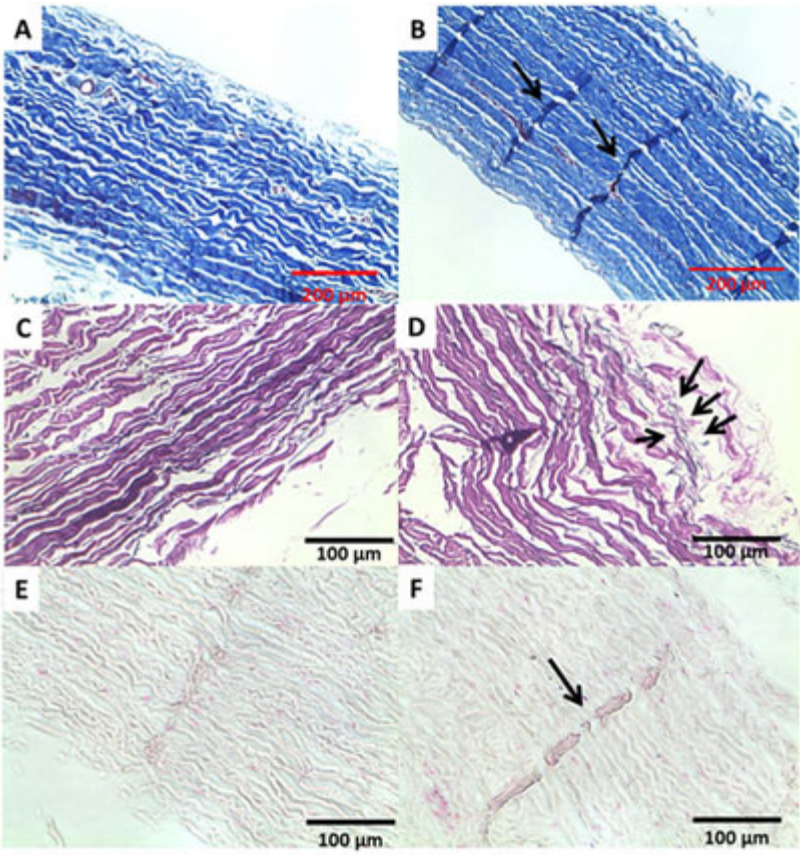

Figure 1. (A) Trichrome stain of an intact pericardial leaflet with normal collagen fibers (blue); **(B)** Crimped pericardium shows damage across the leaflet's thickness (arrows); **(C)** Thin elastic fibers (black) are intact in uncrimped leaflet; **(D)** Arrows show fragmented elastin fibers in crimped samples; **(E)** Crimped leaflet in saline has no hydroxyapatite deposition at the crimped region; **(F)** Crimped pericardium in calcifying buffer show brown hydroxyapatite deposits (arrows) along the site of crimping.

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Footnotes

Author Disclosures: **A. Sinha:** None. **A. Kheradvar:** None.

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