**Bioresorbable vascular scaffold radial expansion and conformation compared to a metallic platform: insights from in vitro expansion in a coronary artery lesion model.**


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**ABSTRACT**

**Aims:**
This study aimed to compare the acute expansion behaviour of a polymer-based bioresorbable scaffold and a second-generation metallic DES platform in a realistic coronary artery lesion model. Experimental mechanical data with conventional methods have so far shown little difference between metallic stents and currently available polymer-based bioresorbable scaffolds (BRS). Nevertheless, differences in acute results have been observed in clinical studies comparing BRS directly with metallic DES platforms.

**Methods and Results:**
We examined the expansion behaviour of the bioresorbable vascular scaffold (3.0×18 mm Absorb BVS; Abbott Vascular, Santa Clara, CA, USA) and a metallic DES (3.0×18 mm XIENCE Prime; Abbott Vascular) after expansion at 37°C using identical coronary artery stenosis models (in total 12 experiments were performed). Device expansion was compared during balloon inflation and after deflation using microscopy to allow assessment of plaque recoil. Minimal lumen diameter (MLD) and minimal lumen area (MLA) and stent eccentricity were quantified from optical coherence tomography (OCT) imaging at nominal diameter and after post-dilation at 18 atm. The MLA in the models with BVS deployed was 4.92±0.17 mm² while in the metallic DES it was 5.40±0.13 mm² (p=0.02) at nominal pressure (NP), and 5.41±0.20 and 6.07±0.25 mm² (p=0.02), respectively, after expansion at 18 atm. Stent eccentricity index at the MLA was 0.71±0.02 in BVS compared to 0.81±0.02 in the metal stent at NP (p=0.004), and 0.73±0.03 compared to 0.75±0.02 at 18 atm (p=0.39).

**Conclusions:**
Results obtained in this in vitro lesion model were comparable to the results in randomised clinical trials comparing BVS and XIENCE stents in vivo. Such models may be useful in future BRS developments to predict their acute response in vivo in eccentric lesions.