Intravascular Lithotripsy in underexpanded coronary stents - a systematic review and meta-analysis

Shree L. Radhakrishnan, MD, MSCI; Leonard M. Glade, MD; Lee S. McDaniel, PhD; Nabeel S. Saghir, MD; Frank E. Wilklow, MD; Murtuza J. Ali, MD.

Background:
Underexpanded coronary stents can predispose to stent thrombosis and in-stent restenosis. Stent underexpansion (SUE) is often managed by high-pressure angioplasty. Intravascular lithotripsy (IVL) has an off-label use in SUE. This meta-analysis aims to review the literature on IVL in SUE.

Methods:
The search words "coronary stent underexpansion AND lithotripsy OR lithoplasty" were used. Studies that reported on strategy success in IVL for SUE were included. The primary outcome is strategy success, defined as adequate expansion of the underexpanded stent.

Results:
This report included 37 studies with 122 subjects and 134 lesions with SUE. The mean age was 69.9 years and 77.6% were male. Strategy success was seen in 111 out of 122 (90.9%) patients. Pre-IVL, the average minimal stent area (MSA) was 2.81 mm². Post-IVL, the average MSA was 6.56 mm². The rate of perforation, coronary dissection and device failure were <1% each. Logistic regression analysis showed no association between strategy success and number of IVL pulses delivered, diameter or pressure of IVL balloon. There is significant heterogeneity between the studies ($I^2 = 54.9\% \ (p <0.0001)$).

Abstract

Definition of strategy success:
Adequate expansion of the underexpanded stent, verified by angiography or intravascular imaging

Conclusions
- IVL is a safe and effective technique to treat underexpanded coronary stents with high success rate and low complication rate.
- Further randomized studies directly comparing IVL to other procedures for management of SUE are required to determine the best treatment option.