The “Skipping Rope” Phenomenon in Transapical TAVI as a Cause of Reversible Mitral Regurgitation

Victor X Mosquera, MD, PhD1*, Alberto Bouzas-Mosquera, MD, PhD2 and José J Cuenca-Castillo, MD1

1Department of Cardiac Surgery, Complejo Hospitalario Universitario de A Coruña, Spain; Instituto de Investigación Biomédica de A Coruña (INIBIC), Spain
2Department of Cardiology, Complejo Hospitalario Universitario de A Coruña, Spain; Instituto de Investigación Biomédica de A Coruña (INIBIC), Spain

Abstract
Mitral regurgitation is a complication that may occur during transcatheter aortic valve implantation (TAVI) and may require different treatments depending on the mechanism. In this report we describe for a “skipping rope sign” in transapical TAVI as a cause of severe mitral regurgitation due to extreme tethering of the anterior mitral leaflet caused by an extra-stiff guidewire entangled in its chordae tendineae during a transapical TAVI.

Keywords
Transapical TAVI, Complications, Mitral regurgitations

Introduction
Mitral regurgitation (MR) is a complication that may occur during transcatheter aortic valve implantation (TAVI) and may require different treatments depending on the mechanism [1]. Its incidence varies between 8.5% to 10.5% probably due to different criteria in evaluation among studies [2]. In this report we describe the “skipping rope” sign of a guidewire in transapical TAVI as a cause of reversible severe MR.

Description
An 81-year-old patient with history of previous coronary surgery, stroke and severe peripheral arterial disease was referred to transapical TAVI due to a symptomatic severe aortic stenosis. After crossing the aortic valve and exchanging a conventional guidewire for an extra-stiff guidewire through a standard transapical approach, the patient developed hemodynamic instability without rhythm disturbances. In the fluoroscopy, the position of the extra-stiff guidewire was correct through the aortic valve yet its trajectory in the left ventricle was too curved, resembling a “skipping rope” (Figure 1 and Video 1). Transeosophageal echocardiography (TEE) identified a new onset severe MR secondary to extreme tethering of the anterior mitral leaflet (AML) (Figure 2 and Video 2) caused by the extra-stiff guidewire that was entangled in the AML chordae tendineae. The guidewire acquired this “skipping rope” disposition in the left ventricular cavity because it was abnormally fixed at two points, namely, its origin in the transapical entrance point and entangled in the AML chordae tendineae. Mitral function was immediately restored after withdrawing the extra-stiff guidewire (Video 2) that allowed recovering the normal coaptation of both mitral leaflets. The guidewire was repositioned again through the aortic valve avoiding the mitral subvalvular apparatus. The transapical TAVI with a balloon-expandable prosthesis was completed without incidences.

Discussion
Mitral regurgitation may occur during TAVI either primary as a deleterious interaction in mitral valve morphology or function or secondary as an impairment in the left ventricle function and left ventricle dilatation [3]. Reported mechanisms [1-4] include structural damage of the mitral valvular or subvalvular apparatus, impingement of the aortic prosthesis on the AML, rupture of the chordae tendineae,
In our report, the MR was caused by remarkable tethering of the AML by the entangled extra-stiff guidewire. Nonetheless, the particularity of this report is the “skipping rope” disposition that the guidewire acquired because it was fixed at two separated points yet, at the same time, loose enough in the ventricular cavity to resemble a “skipping rope” systolic anterior movement of the AML, and biventricular a syncronic mechanical contraction owed to right ventricle pacemaker stimulation among others. Some of these mechanisms are transient and reversible, while some of them may condition a definitive severe MR that will obscure the patient’s prognosis.

Figure 1: The fluoroscopy shows the diagnostic guidewire crossing correctly the aortic valve through the transapical access. However, notice that the guidewire trajectory in the left ventricle is too curved, like a “skipping rope”, fixed at two points, namely, the transapical access point (yellow arrow) and the mitral subvalvular apparatus (green arrow).

Figure 2: TEE images demonstrate severe tethering of the anterior mitral leaflet (blue arrow) by the extra-stiff guidewire (red arrow) that causes a total lack of systolic coaptation. Notice that at systole, while the posterior mitral leaflet reaches the annular plane, the anterior mitral leaflet is remarkably distanced from the annular plane.
The “Skipping Rope” Phenomenon in Transapical TAVI as a Cause of Reversible Mitral Regurgitation

All authors approved the manuscript and this submission.

The patient signed up the written consent approved by the Institutional Review Board, allowing the publication of his clinical images and data.

References


