

## The challenging pathway to TAVI: in memory of Alain Cribier

### *El arduo camino hacia el TAVI: en recuerdo de Alain Cribier*

Eulogio García,<sup>a,\*</sup> Leire Unzué,<sup>b</sup> and Rodrigo Teijeiro<sup>b</sup>

<sup>a</sup> Servicio de Cardiología Intervencionista, Hospital Gregorio Marañón, Hospital Clínico San Carlos, Hospital Montepríncipe y Hospital Moncloa, Madrid, Spain

<sup>b</sup> Servicio de Cardiología Intervencionista, Hospital Montepríncipe y Hospital Moncloa, Madrid, Spain

In 1998, in response to a comment on the limited durability of an aortic valvuloplasty performed during the last Madrid Interventional Cardiology (MIC) course, Alain Cribier insightfully stated: "We'll mount a stent on the valvuloplasty balloon, attach the leaflets, and problem solved." Four years and countless hours of work later, both at his hospital in Rouen, France, and at the animal experimentation center in Lyon, France, the recently deceased Alain Cribier (1945-2024) achieved a groundbreaking milestone.<sup>1</sup> On April 16, 2002, he performed the world's first surgery-free transcatheter aortic valve implantation (TAVI), prolonging the patient's life and revolutionizing heart valve surgery. This innovation dramatically improved the quality of life of a high percentage of patients with severe aortic stenosis who were ineligible for conventional heart surgery. Since then, more than a million patients have benefited from his technological innovation.

After this pivotal first case of TAVI,<sup>1</sup> isolated procedures were performed in selected patients in the following years, with few technical variations, and all via antegrade access. While interventional cardiologists were enthusiastic and had high expectations, critics predicted apocalyptic disasters due to alleged complications, such as vascular complications, valve instability and migration, coronary occlusion, strokes, annular and aortic rupture, paravalvular regurgitation, and concerns about the durability of the valve. In 2006, the first clinical trials (REVIVAL<sup>2</sup> in the United States and REVIVE<sup>3</sup> in Europe) changed the procedure strategy. The adoption of retrograde access, facilitated by the versatility of a flexible carrier catheter, considerably simplified the technique and contributed to its widespread adoption.

After a stay in Vancouver, Canada to acquire theoretical and practical training in the technique, and with Cribier's assistance, a team of interventional cardiologists from Hospital Gregorio Marañón, Madrid, Spain successfully implanted the first 2 aortic valves via transfemoral access in Spain on April 23, 2007 (figure 1). Throughout 2007, the team contributed to the REVIVE trial, successfully treating 10 patients with transfemoral TAVI, with no perioperative mortality or major complications. This success, with contributions from other European centers, paved the way for the approval of this technology for clinical use.

After standardizing and defining the complications associated with the procedure,<sup>4</sup> the randomized PARTNER clinical trials were conducted in inoperable patients and high-risk surgical patients.<sup>5,6</sup> These trials confirmed the safety and efficacy of TAVI, establishing



**Figure 1.** First transcatheter aortic valve implantation performed in Spain, on April 23<sup>rd</sup>, 2007. In the photograph, from left to right, Dr. Alain Cribier, Dr. Eulogio García, and Dr. Javier Ortal.

it as the treatment of choice for high-risk patients.<sup>7</sup> Eventually TAVI became the preferred treatment for all patients with aortic stenosis older than 75 years.<sup>8-10</sup>

In this exciting journey, we contributed a few technical improvements, demonstrating the safety of direct implantation without prior valvuloplasty<sup>11</sup> and improving the management of vascular access via contralateral access.<sup>12</sup> The gradual simplification of TAVI led to its classification as a "minimally invasive procedure". It is now available in all cath labs, with more than 1 million valves implanted in all 5 continents.<sup>13</sup>

Alain Cribier was technically elegant and efficient; meticulous, systematic, and generous in his teaching. His perseverance in the management of aortic stenosis drove him to seek a definitive solution. Bernard Guiraud-Chaumeil, former president of the French health assessment department, highlighted Cribier's exceptional contribution to the management of valvular heart disease, stating: "Revolutionary advances in medicine must be accessible to patients

\* Corresponding author.

E-mail address: [Ejgarcia1@telefonica.net](mailto:Ejgarcia1@telefonica.net) [E. García].

✉ [@Eulogio43942113](mailto:@Eulogio43942113)

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as soon as possible." Cribier's dedication, perseverance, and ingenuity changed the history of severe aortic stenosis; his legacy will not only save thousands of lives but will also improve the clinical practice of present and future generations of interventional cardiologists.

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## CONFLICTS OF INTEREST

None declared.

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