

## INTERVENTIONAL CARDIOLOGY UPDATE

## Prognostic Markers in Transcatheter Mitral Valve Repair

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### ABBREVIATIONS

BNP = brain natriuretic peptide  
eGFR = estimated glomerular filtration rate  
MR = mitral regurgitation  
NYHA = New York Heart Association

The Mitraclip procedure is at present the most widely available method for transcatheter correction of severe mitral regurgitation (MR). The efficacy and the safety of the device has been evaluated in the EVEREST II randomized control study<sup>1</sup> (head to head comparison with traditional surgical repair or replacement of the mitral valve) and although not as effective in abolishing MR, it provided significant improvement in functional class, along with evidence of favorable ventricular remodeling and with low perioperative morbidity and mortality. Currently, over 13,000 implantations have been performed worldwide with the number rising steadily. Results from the “real world” application of the procedure come from the ACCESS EU registry.<sup>2</sup> The procedural success (i.e. successful implantation of Mitraclip with reduction in MR to  $\leq 2+$ ) can be expected in  $>95\%$  of cases; 2/3 of patients have functional MR and 1/3 degenerative MR; more than 1 clip is required in about 40% of cases and morbidity / mortality are fairly low despite the high risk patient population selected for the procedure. Case control studies<sup>3</sup> suggest that the Mitraclip, in addition to improving quality of life, results in a decrease in re-hospitalization rates for heart failure, and may also improve survival (compared to medical therapy alone).

The initial anatomic criteria proposed by the EVEREST II study are well described.<sup>1</sup> In practice though and with expanding experience, operators have ventured and successfully treated patients with non-EVEREST anatomies, as for example non-central MR jets, left ventricular ejection fraction  $<25\%$ , end systolic diameter  $>55$  mm.<sup>4,5</sup> The only original EVEREST criterion that appeared to predict unsuccessful result is mitral valve area (MVA)  $<4.0$  cm<sup>2</sup>. In the same study,<sup>4</sup> the presence of severe degenerative MR also impacted negatively on procedural success (compared to functional MR). The number of clips necessary to achieve sufficient MR reduction appears to be influenced by the degree of MR as measured by baseline regurgitant volume;<sup>6</sup> in addition, anatomical factors and in particular increased anterior leaflet thickness also appears to be associated with increased odds of implanting two devices.<sup>6</sup>

In addition, biochemical markers may also predict short and long term outcomes. The presence of a decreased eGFR level has been shown to be an independent predictor of longer hospitalization post MitraClip.<sup>7</sup> Advanced heart failure as evidenced by an elevated pro-BNP level ( $\geq 1600$  pg/ml) before the procedure was identified as an independent risk factor for mortality at follow up in patients with functional MR.<sup>8</sup>

Long term outcomes following Mitraclip depend on achievement of acute procedural success (implant and reduction of MR grade to  $\leq 2+$ ) and on the degree of residual MR at discharge from the hospital.<sup>9</sup> In addition, it has been shown that a forward stroke volume  $<50$  ml (highlighting decreased inotropic reserve of the left ventricle), was the most powerful predictor of both rehospitalization and for the composite end point of death, rehospitalization and reintervention.<sup>4</sup>

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In aggregate, current studies appear to agree on the safety and efficacy of the procedure with significant improvements in NYHA functional class, re-hospitalization rates, and left ventricular remodeling. Prognostic markers may further help in identifying patients most likely to benefit, as well as patients that may be too far advanced in the disease process for the procedure to make a difference.

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