

## **Research and development of an in-vitro lesion model of mitral regurgitation that mimics the clinical setting and fulfills the surgical indication**

Yusei OKAMOTO<sup>1</sup>

Hayato MORIMURA, Jumpei Takada, Shiho MINETA, Kota OSHIMA and Kiyotaka IWASAKI

<sup>1</sup> Waseda University

**Introduction** Because of its highly invasive nature, only 15% of the patients of mitral regurgitation (MR) actually receives surgery. Although transcatheter mitral valve repair devices have been developed to overcome this situation, only one device is commercially available in the US and Japan. Thus, further research and development is needed. For the development of novel devices and further investigation of current devices, an evaluation system is imperative. Therefore, the purpose of this study is to develop a repairable lesion model of MR which produces sufficient regurgitation that fulfill the interventional indication. **Methods** Part of the left atrium and mitral valve were excised from a porcine heart, and the left atrial wall was sutured to a silicone sheet, which was incorporated into a pulsatile circulation simulator. Two kinds of models were produced: degenerative MR (DMR) and functional MR(FMR). In the DMR model, P2 chordae were severed to produce P2 prolapse. The model was then repaired by implanting artificial chordae. In the FMR model, the annulus was simultaneously immersed in collagenase solution and dilated by inserting a dilator. The model was then repaired with the Edge-to-Edge technique. In each model, the regurgitant fraction(RF) before and after the valve repair procedure was measured. **Result** In the DMR model, mean RF was  $56.5\pm 5.9\%$  and  $25.7\pm 4.6\%$  ( $p<0.001$ ) before and after the valve repair procedure, which was  $47.0\pm 2.6\%$  and  $27.8\pm 3.2\%$  ( $p<0.001$ ) in the FMR model. **Conclusion** We successfully developed a model which mimic the characteristic of DMR and FMR. Both models developed sufficient regurgitation which fulfill the interventional indication. Moreover, they were both repairable by applying surgical procedures which reflects the ability of the model to evaluate mitral valve repair procedures and devices.