Manuscript Title: Transmural Remodeling of Right Ventricular Myocardium in Response to Pulmonary Arterial Hypertension

Supplementary Information

In this appendix, we discuss the procedure to estimate the parameters a and b using the measurements of the RVFW dimensions and the RV volume. These parameters were needed to compute the wall stress components in Eqs. (18) and (19). As mentioned in Subsection 2.5, our morphological measurements included the thickness of the RVFW, the circumferential length (denoted by L_1 in Fig. 3b), longitudinal length of the RVFW and the volume of the RV cavity up to equator. Using our geometrical model in Fig. 3b, the circumferential length of the RVFW can be approximated by the arc

$$L_1 = a \int_0^{\pi/2-t} \sqrt{1-e^2\sin(\varphi)}\, d\varphi, \tag{S1}$$

with the eccentricity $e=\sqrt{1-(b/a)^2}$. Also, the longitudinal length is also approximated by the arc

$$L_2 = (a-w)[\pi/2-\tan^{-1}(\zeta_0/b)] \quad \text{with} \quad \zeta_0 = \sqrt{\frac{(a-w)^2-b^2}{1-b^2/L^2}}, \tag{S2}$$

where L denotes the outer depth of the prolate spheroid used to represent the LV in the biventricular model (see Fig. 3a). Also, the RV volume in the biventricular model may be expressed as

$$V = \int_0^{\zeta_0} \left\{ \frac{\pi}{2}\left[\zeta_1\zeta_2 - \zeta_r^2\right] + t_\zeta \zeta_r^2 - \zeta_1\zeta_2 \tan^{-1}\left(\frac{\zeta_2}{\zeta_1}\tan(t_\zeta) \right) \right\} d\zeta, \tag{S3}$$

where

$$t_\zeta = \tan^{-1}\left(\frac{\zeta_2}{\zeta_1}\sqrt{\frac{\zeta_1^2 - \zeta_r^2}{\zeta_r^2 - \zeta_2^2}} \right), \qquad \zeta_r = b\sqrt{1-\zeta^2/L^2}, \qquad \zeta_1 = \sqrt{(a-w)^2-\zeta^2},$$

$$\zeta_2 = (b-w)\sqrt{1-\zeta^2/(a-w)^2},$$

and ζ measures the depth in the RV chamber. As already mentioned, we measured the values L_1, L_2 and V in our experimental study for both normal and PAH cases [14].

Using these assumption, the parameters L, a and b were calculated from Eqs. (S1), (S2), and (S3).