## Supplemental Data

### Supplemental Table 1. Surgical indications.

| SURGICAL INDICATION                                      | All (n=1045)       | Men (n=794)    | Women (n=251) | P-value |
|----------------------------------------------------------|--------------------|----------------|---------------|---------|
| Aortic valve stenosis, n (%)                             | 561 (53.7)         | 377 (47.5)     | 184 (73.3)    | <0.001  |
| Mean gradient, mmHg                                      | 52.3 ± 15.0 (n=539)| 50.8 ± 14.0 (n=363)| 55.4 ± 16.4 (n=176)| 0.001  |
| Severe AS, n (%)                                         | 479 (45.9)         | 315 (39.7)     | 164 (65.3)    | <0.001  |
| Moderate AS with dilatation ≥4.5 cm, n (%)               | 51 (4.9)           | 43 (5.4)       | 8 (3.2)       | 0.153   |
| Severe AS with dilatation ≥5.5 cm, n (%)                 | 12 (1.1)           | 7 (0.9)        | 5 (2.0)       | 0.173   |
| Aortic valve insufficiency, n (%)                        | 249 (23.8)         | 231 (29.1)     | 18 (7.2)      | <0.001  |
| Severe AI, n (%)                                         | 202 (19.3)         | 187 (23.6)     | 15 (6.0)      | <0.001  |
| Moderate AI with dilatation ≥4.5 cm, n (%)               | 34 (3.3)           | 27 (3.4)       | 7 (2.8)       | 0.634   |
| Severe AI with dilatation ≥5.5 cm, n (%)                 | 14 (1.3)           | 13 (1.6)       | 1 (0.4)       | 0.208   |
| Aortic dilatation, n (%)                                 | 97 (9.3)           | 72 (9.1)       | 25 (10.0)     | 0.671   |
| Maximum diameter, cm, median [IQR]                       | 5.3 [0.8]          | 5.4 [0.7]      | 5.0 [0.8]     | 0.014   |
| Aorta ≥5.5 cm, n (%)                                     | 36 (3.4)           | 31 (3.9)       | 5 (2.0)       | 0.148   |
| Other cardiac surgery, n (%)                             | 15 (1.4)           | 13 (1.6)       | 2 (0.8)       | 0.542   |
| AS or AI, degree missing, n (%)                          | 8 (0.8)            | 8 (1.0)        | 0 (0.0)       | 0.210   |
| Aortic dilatation, dimensions missing, n (%)             | 1 (0.1)            | 1 (0.1)        | 0 (0.0)       | 1.000   |
| AS or AI and aortic dilatation, severity and dimensions missing, n (%) | 3 (0.3) | 2 (0.3) | 1 (0.4) | 0.562 |

AS=aortic valve stenosis. AI=aortic valve insufficiency. IQR=interquartile range.
Supplemental Table 2. Correlations with any aortic dilatation, male patients (n=712).

|                  | UNIVARIATE  | OR   | 95% CI          | P-value |
|------------------|-------------|------|-----------------|---------|
| Age              | 1.004       | 0.993 - 1.015 | 0.499 |
| BSA              | 5.44        | 2.322 - 12.749 | <0.001 |
| Dyslipidemia     | 0.916       | 0.568 - 1.476 | 0.718 |
| Hypertension     | 1.176       | 0.857 - 1.613 | 0.315 |
| CABG             | 1.129       | 0.588 - 2.165 | 0.716 |
| Valve disease (Ref: AS) | | | |
| AI               | 1.102       | 0.794 - 1.529 | 0.562 |
| Phenotype (Ref: RL) | | | |
| RN               | 0.639       | 0.401 - 1.018 | 0.059 |
| LN               | 0.231       | 0.029 - 1.863 | 0.169 |
| 2-sinus          | 0.903       | 0.52 - 1.568  | 0.718 |
| MULTIVARIATE     |             |      |                 |         |
| Age              | 1.01        | 0.996 - 1.023 | 0.155 |
| BSA              | 5.775       | 2.425 - 13.753 | <0.001 |
| Valve disease (Ref: AS) | | | |
| AI               | 1.24        | 0.839 - 1.833 | 0.281 |
| Phenotype (Ref: RL) | | | |
| RN               | 0.643       | 0.401 - 1.031 | 0.067 |
| LN               | 0.287       | 0.035 - 2.355 | 0.245 |
| 2-sinus          | 0.916       | 0.521 - 1.61   | 0.761 |

BSA=body surface area. CABG=coronary artery bypass grafting. AS=aortic valve stenosis. AI=aortic valve insufficiency. RL=right-left fusion. RN=right-non-coronary fusion. LN=left-non-coronary fusion. OR=odds ratio.
### Supplemental Table 3. Correlations with root phenotype dilatation, male patients (n=712).

| UNIVARIATE                  | OR     | 95% CI          | P-value |
|-----------------------------|--------|-----------------|---------|
| Age                         | 0.987  | 0.951 - 1.024   | 0.479   |
| BSA                         | 0.557  | 0.031 - 10.095  | 0.692   |
| Hypertension                | 1.080  | 0.371 - 3.147   | 0.887   |
| Dyslipidemia                | 0.000  | -               | 0.997   |
| CABG                        | 1.233  | 0.157 - 9.655   | 0.842   |
| **Valve disease (Ref: AS)** |        |                 |         |
| AI                          | 1.074  | 0.356 - 3.240   | 0.899   |
| **Phenotype (Ref: RL)**     |        |                 |         |
| RN                          | 0.000  | -               | 0.996   |
| LN                          | 0.000  | -               | 0.999   |
| 2-sinus                     | 4.906  | 1.591 - 15.124  | 0.006   |

| MULTIVARIATE                |        |                 |         |
|-----------------------------|--------|-----------------|---------|
| Age                         | 0.999  | 0.960 - 1.039   | 0.947   |
| BSA                         | 0.522  | 0.039 - 6.965   | 0.623   |
| **Valve disease (Ref: AS)** |        |                 |         |
| AI                          | 0.842  | 0.250 - 2.835   | 0.781   |
| **Phenotype (Ref: RL)**     |        |                 |         |
| RN                          | 0.000  | -               | 0.996   |
| LN                          | 0.000  | -               | 0.999   |
| 2-sinus                     | 4.810  | 1.516 - 15.259  | 0.008   |

BSA = body surface area. CABG = coronary artery bypass grafting. AS = aortic valve stenosis. AI = aortic valve insufficiency. RL = right-left fusion. RN = right-non-coronary fusion. LN = left-non-coronary fusion. OR = odds ratio.