1. BACKGROUND AND AIMS

- Mitral heart valve (MV) function relies on its mechanical properties and structural integrity. A compromise in these leads to dysfunctions that can endanger a person's life.
- Computational models provide further insight on valve mechanics and their accuracy is sensitive to valve geometry.
- Current mathematical models representing MV structure are based on assumptions and differ from realistic valves.
- Here, we built a mathematical model for the MV based on realistic dimensions and correlations and we study the impact of varying relevant valve dimensions in its function.

2. METHODOLOGY

- Revision of MV shape and identification of relevant landmarks, dimensions, and correlations.
  - Literature review concerning MV dimensions available for healthy and diseased cases, as well as valve shapes obtained by medical images and designed in computational works.
  - Computational manipulation of porcine MV leaflets to match a human valve shape and dimensions from the literature (Fig. 3).

- Development of a mathematical model incorporating all aspects of the MV structure.

3. COMPUTATIONAL RESULTS

- Normal coaptation.
- Poor coaptation.

- Our mathematical MV model simulates accurate physiological function, with normal coaptation (closing) associated parameters resembling those of the literature.
- Different valve geometrical changes are associated with different cases of function.
- Diseased valve configurations (poor coaptation and leaflet billowing) are associated with greater valve tissue stress at the posterior leaflet, exhibiting greater damaging.

4. DISCUSSION

- Our model provides with adjustable geometric detail, useful to study customized cases of the MV shape.
- This framework can indicate which shape configurations are associated with unfavourable performance, helping clinicians understand which patients are at greater risk of disease onset and progression.

5. WHAT’S NEXT?

- Incorporation of more information on the mathematical model.
- Assessment of other dimensional changes in MV function.

6. REFERENCES

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