

Dynamic changes of mitral annulus in patients with degenerative mitral regurgitation and chronic atrial fibrillation undergoing mitral valve reconstruction.

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| 著者     | NAHAR Nurun   |
| 学位授与機関 | 滋賀医科大学  |
| 学位授与年度 | 令和2年度   |
| 学位授与番号 | 14202甲第900号   |
| 発行年    | 2021-03-09  |
| URL    | <a href="http://hdl.handle.net/10422/00012999">http://hdl.handle.net/10422/00012999</a> |

doi: 10.1007/s11748-020-01406-2(<https://doi.org/10.1007/s11748-020-01406-2>)

氏 名 NAHAR NURUN

学 位 の 種 類 博士 (医学)

学 位 記 番 号 博士甲第 900

学 位 授 与 の 要 件 学位規則第 4 条第 1 項

学 位 授 与 年 月 日 令和 3 年 3 月 9 日

学 位 論 文 題 目 Dynamic changes of mitral annulus in patients with degenerative mitral regurgitation and chronic atrial fibrillation undergoing mitral valve reconstruction.

(慢性心房細動を合併した変性僧帽弁閉鎖不全症に対して僧帽弁形成術を施行する患者における僧帽弁輪形態の動的変化)

審 査 委 員 主査 教授 渡邊 嘉之

副査 教授 前川 聡

副査 教授 一杉 正仁

## 論文内容要旨

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| *整理番号   | 909   | (ふりがな)<br>氏名 | ナハヌルン<br>Nurun Nahar |
| 学位論文題目  | <p>Dynamic changes of mitral annulus in patients with degenerative mitral regurgitation and chronic atrial fibrillation undergoing mitral valve reconstruction.</p> <p>慢性心房細動を合併した変性僧帽弁閉鎖不全症に対して僧帽弁形成術を施行する患者における僧帽弁弁輪形態の動的变化</p> |              |                      |
| <p><b>Background and purpose</b><br/>Atrial fibrillation (AF) has been shown to be an independent, significant risk factor for mortality after mitral valve surgery in patients with degenerative mitral regurgitation (DMR). The onset of AF is a critical turning point in the disease progression suggesting that mitral valve repair may be complicated and difficult but little is still known about mitral annular dynamics in patients with AF undergoing mitral valve repair for DMR. We therefore evaluated mitral annulus size, shape, and motion during the cardiac cycle using three dimensional transesophageal echocardiography in DMR patients with AF compared with normal control subjects and DMR patients without AF.</p> <p><b>Methods and Results</b><br/>One hundred and fifty-one consecutive patients undergoing mitral valve reconstruction for mitral regurgitation due to myxomatous disease between July 2013 and May 2016 were included. Of these, 117 had a sinus rhythm (SR group) and 34 had chronic AF (AF group). Patients who underwent aortic surgery and were found to have no underlying cardiac valve disease nor coronary artery disease were included as the control group (<math>n = 20</math>). Real-time three-dimensional trans-esophageal echocardiography (3D-TEE) with mitral valve quantification (MVQ) analysis was used to assess mitral annulus shape, size, and movements.<br/>Annular areas in the control group were the smallest of the three groups and changed considerably through the cardiac cycle. Mean anteroposterior and intercommissural diameter measurements in the SR group were significantly larger but oscillated less than in the control group.</p> |   |              |                      |

Those diameters were the largest in the AF group and oscillated very little. Dilatation of the annulus in the AF and SR groups was accompanied by flattening and marked loss of oscillation in the height-to-intercommissural-width ratio which should peak in early systole.

### Discussion

This study was conducted to show mitral annular geometry and dynamics in patients with DMR without AF and DMR with AF. Our findings are consistent with the view of a degenerative progression from normal, through DMR with annulus dilatation and loss of annulus dynamics, to further dilatation, with loss of annulus dynamics, with AF. The most obvious aspect of lost dynamics is the ratio of height to IC diameter. In terms of staging of disease, the loss of annulus dynamics without AF might be seen as a marker of mid-stage DMR, so although 3D-TEE is invasive, it might be useful for assessing DMR just before surgery. Real-time 3D-TEE allows thorough analysis of MV annular geometry and dynamics, which in turn allows accurate 3D modelling of the annulus, and facilitates understanding of valve structure and malfunction. Echocardiography guides surgeons considering valve repair, indicating appropriate timing of surgery by showing the severity of MR, ventricular and atrial dimensions, and reduces the risk of later need for reoperation by intraoperative assessment of the valve structure and residual mitral regurgitation.

### Conclusion

In patients with DMR undergoing MV surgery, preoperative chronic AF is associated with more progressed annular remodeling, characterized by marked enlargement of annular area, circumference, and anteroposterior diameter.

- (備考) 1. 論文内容要旨は、研究の目的・方法・結果・考察・結論の順に記載し、2千字程度でタイプ等を用いて印字すること。  
2. ※印の欄には記入しないこと。

## 博士論文審査の結果の要旨

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|---|-----|----|-------------|
| 整理番号  | 909 | 氏名 | Nurun Nahar |
| 論文審査委員  |     |    |             |
| <p>(博士論文審査の結果の要旨)</p> <p>本論文では 僧帽弁閉鎖不全症 (MR) の術前患者を対象に経食道3次元エコーを施行し、エコー画像から僧帽弁形態の動態解析を行い、弁輪の形状、サイズ、動きについて検討している。MR症で心房細動 (AF) の無い症例 (SR群)、AFを合併する症例 (AF群)、弁膜疾患の無い症例 (大動脈手術:CR群) の3群間での検討を行い、画像解析は2名が機器付属の僧帽弁定量解析ソフトを用いて行い、以下の点を明らかにした。</p> <ol style="list-style-type: none"> <li>1) 弁輪面積はCR群にて有意に小さい。</li> <li>2) AF群での弁輪面積は、AFの罹患期間と相関して拡大している。</li> <li>3) AP-IC径 (弁輪の縦横径) ではSR群はCR群より有意に大きく、AF群はSR群よりもさらに大きい。しかし、心拍動間の変動ではSR群はCR群より小さく、AF群はさらに小さい。</li> <li>4) CR群では収縮早期に見られる弁の開閉運動がSR,AF群では認められなくなっている。</li> </ol> <p>本論文は、MR症においてCR群とMR群で僧帽弁の形状・動態変化を認め、MR症の中でも心房細動の有無によりその形態、動態に変化があることについて新たな知見を与えたものであり、また最終試験として論文内容に関連した試問を実施したところ合格と判断されたので、博士 (医学) の学位論文に値するものと認められた。</p> <p style="text-align: right;">(令和 3年 1月 27日)</p> |     |    |             |