LivaNova

Health innovation that matters

MEMO 4D®

Reshaping Mitral Repair

CLINICAL RESUME

MEMO PLATFORM CLINICAL PERFORMANCE AND *IN VIVO* SEMIRIGID PROPERTIES

1. **Annular dynamics of Memo 3D annuloplasty ring evaluated by 3D transesophagea echocardiography**
   Nishi H.
   Gen Thorac Cardiovasc Surg 2018 Apr;66(4):214-219

2. **Physiological mitral annular dynamics preserved after ring annuloplasty in mid-term period**
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3. **A Comparison of 2 Mitral Annuloplasty Rings for Severe Ischemic Mitral Regurgitation: Clinical and Echocardiographic Outcomes**
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12. **Current Trends in Mitral Valve Repair Techniques in North America**
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13. **First-in-man implantation of a Sorin Memo 3D ring: Mitral annular flexibility is still preserved at 5 years of follow-up!**
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    Bruno P. G.
    Ann Thorac Surg 2009 Nov;88(5):1492-8

"RECHORD" CHORDAL GUIDING SYSTEM CLINICAL EVIDENCE

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   Prinzing A.
   Ann Thorac Surg 2018 Jun;105(6):1784-1789

2. **Mitral Valve Repair Using a Prosthetic Ring With Chordal Sizing System: a Modified Technique in the Presence of Myxomatous Leaflets**
   Lio A.
   Eur J Cardiothorac Surg 2017;52:820-2

3. **Mitral valve repair using a semirigid ring: patient selection and early outcomes**
   Wan S.
   Asian Cardiovasc Thorac Ann 2016 Sep;24(7):647-52

4. **Minimally invasive mitral valve repair using a semi-rigid annuloplasty ring with a new chordal sizing system: the Memo3D ReChord**
   Glauber M.
   Ann Cardiothorac Surg 2015 May;4(3):298-300

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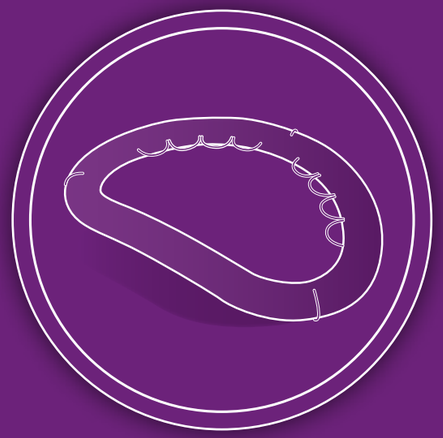
1. **Sovering anuloplasty rings: Experimental pathology in the sheep model**
   Della Barbera M.
   Cardiovasc Pathol 2005 Mar-Apr;14(2):96-103

MEMO PLATFORM CLINICAL PERFORMANCE AND *IN VIVO* SEMIRIGID PROPERTIES



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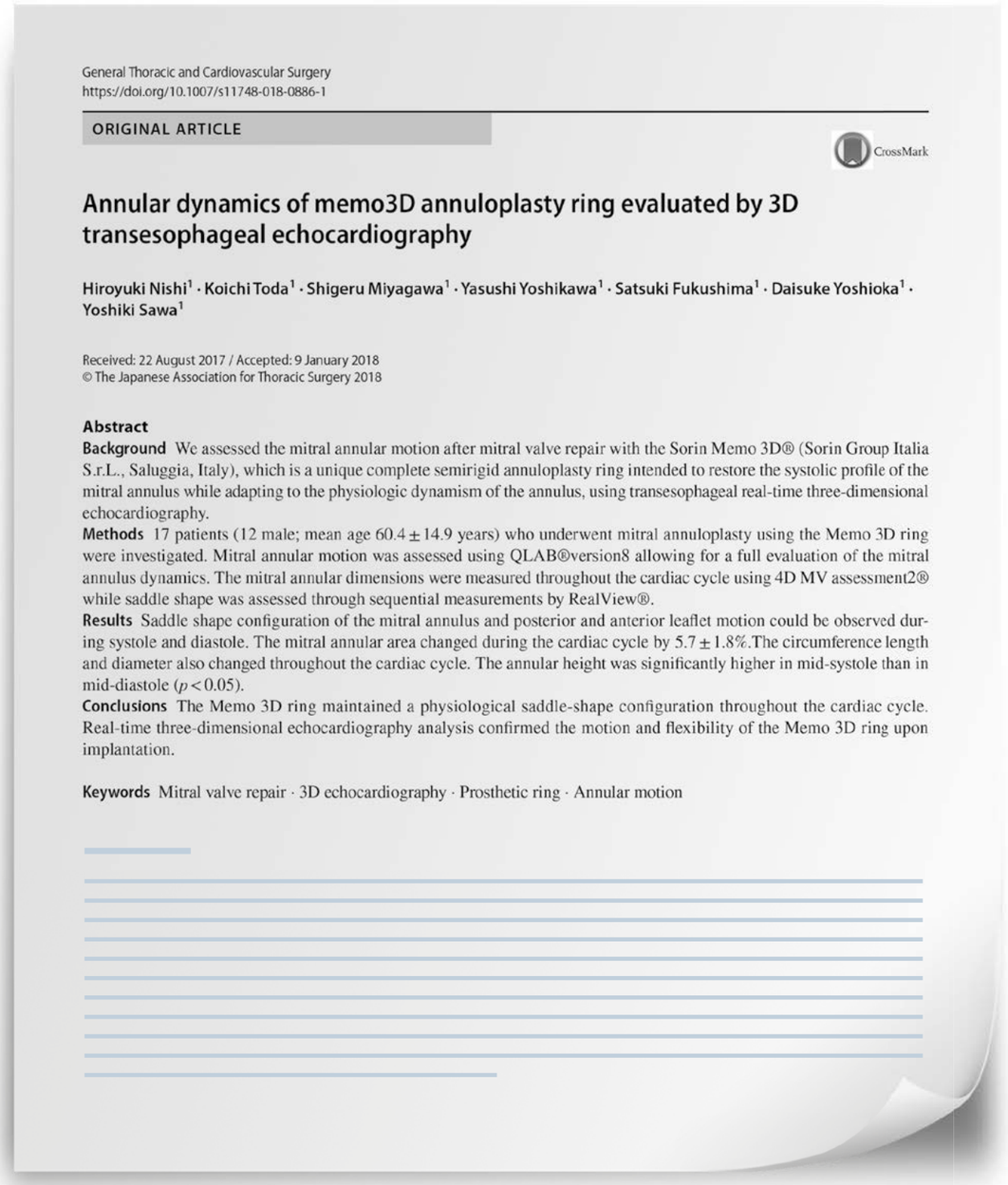
Annular dynamics of Memo 3D annuloplasty ring evaluated by 3D transesophageal echocardiography



General Thoracic and Cardiovascular Surgery
https://doi.org/10.1007/s11748-018-0886-1

ORIGINAL ARTICLE

CrossMark

Annular dynamics of memo3D annuloplasty ring evaluated by 3D transesophageal echocardiography

Hiroyuki Nishi[1] · Koichi Toda[1] · Shigeru Miyagawa[1] · Yasushi Yoshikawa[1] · Satsuki Fukushima[1] · Daisuke Yoshioka[1] · Yoshiki Sawa[1]

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Abstract

Background We assessed the mitral annular motion after mitral valve repair with the Sorin Memo 3D® (Sorin Group Italia S.r.L., Saluggia, Italy), which is a unique complete semirigid annuloplasty ring intended to restore the systolic profile of the mitral annulus while adapting to the physiologic dynamism of the annulus, using transesophageal real-time three-dimensional echocardiography.

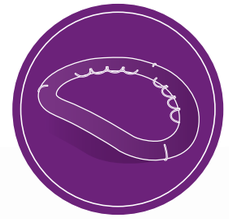
Methods 17 patients (12 male; mean age 60.4 ± 14.9 years) who underwent mitral annuloplasty using the Memo 3D ring were investigated. Mitral annular motion was assessed using QLAB®version8 allowing for a full evaluation of the mitral annulus dynamics. The mitral annular dimensions were measured throughout the cardiac cycle using 4D MV assessment2® while saddle shape was assessed through sequential measurements by RealView®.

Results Saddle shape configuration of the mitral annulus and posterior and anterior leaflet motion could be observed during systole and diastole. The mitral annular area changed during the cardiac cycle by 5.7 ± 1.8%.The circumference length and diameter also changed throughout the cardiac cycle. The annular height was significantly higher in mid-systole than in mid-diastole ($p < 0.05$).

Conclusions The Memo 3D ring maintained a physiological saddle-shape configuration throughout the cardiac cycle. Real-time three-dimensional echocardiography analysis confirmed the motion and flexibility of the Memo 3D ring upon implantation.

Keywords Mitral valve repair · 3D echocardiography · Prosthetic ring · Annular motion

Nishi H.
Gen Thorac Cardiovasc Surg 2018 Apr;66(4):214-219



1

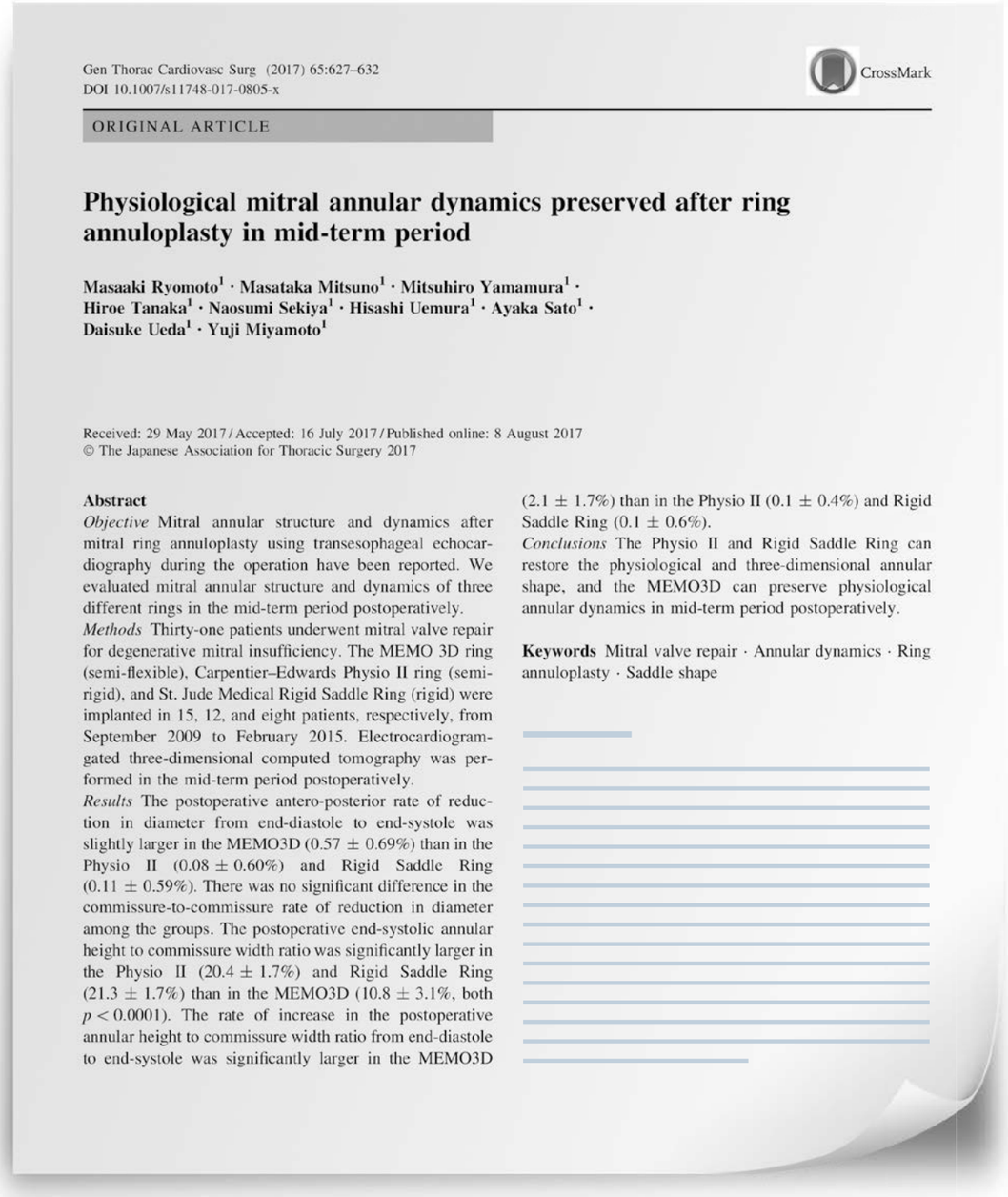
"Unlike other semirigid rings, the Memo3D, while planar at implantation, allows for a physiologic saddle- shape configuration during systole and diastole with full flexibility of the annulus during the cardiac cycle."

"In long-term study, rigid rings have shown worse outcomes in terms of improvement of ejection fraction and preservation of mitral valve areas during cardiac cycle without additional effects on overall survival, mortality, reoperation, recurrence of regurgitation, and left ventricular performance."

"...Memo 3D showed excellent hemodynamic results preserving both mitral annular flexibility and functionality through standard two-dimensional transthoracic echocardiography."

"In this study, the use of real-time three dimensional echocardiography demonstrated that the use of this annuloplasty ring allows for a saddle-shaped con figuration whilst stabilizing the mitral annulus."

Physiological mitral annular dynamics preserved after ring annuloplasty in mid-term period



Gen Thorac Cardiovasc Surg (2017) 65:627–632
DOI 10.1007/s11748-017-0805-x

ORIGINAL ARTICLE

Physiological mitral annular dynamics preserved after ring annuloplasty in mid-term period

Masaaki Ryomoto[1] · Masataka Mitsuno[1] · Mitsuhiro Yamamura[1] · Hiroe Tanaka[1] · Naosumi Sekiya[1] · Hisashi Uemura[1] · Ayaka Sato[1] · Daisuke Ueda[1] · Yuji Miyamoto[1]

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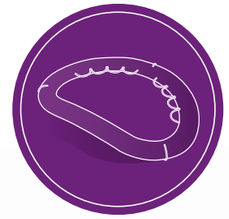
Abstract
Objective Mitral annular structure and dynamics after mitral ring annuloplasty using transesophageal echocardiography during the operation have been reported. We evaluated mitral annular structure and dynamics of three different rings in the mid-term period postoperatively.
Methods Thirty-one patients underwent mitral valve repair for degenerative mitral insufficiency. The MEMO 3D ring (semi-flexible), Carpentier–Edwards Physio II ring (semi-rigid), and St. Jude Medical Rigid Saddle Ring (rigid) were implanted in 15, 12, and eight patients, respectively, from September 2009 to February 2015. Electrocardiogram-gated three-dimensional computed tomography was performed in the mid-term period postoperatively.
Results The postoperative antero-posterior rate of reduction in diameter from end-diastole to end-systole was slightly larger in the MEMO3D (0.57 ± 0.69%) than in the Physio II (0.08 ± 0.60%) and Rigid Saddle Ring (0.11 ± 0.59%). There was no significant difference in the commissure-to-commissure rate of reduction in diameter among the groups. The postoperative end-systolic annular height to commissure width ratio was significantly larger in the Physio II (20.4 ± 1.7%) and Rigid Saddle Ring (21.3 ± 1.7%) than in the MEMO3D (10.8 ± 3.1%, both $p < 0.0001$). The rate of increase in the postoperative annular height to commissure width ratio from end-diastole to end-systole was significantly larger in the MEMO3D (2.1 ± 1.7%) than in the Physio II (0.1 ± 0.4%) and Rigid Saddle Ring (0.1 ± 0.6%).
Conclusions The Physio II and Rigid Saddle Ring can restore the physiological and three-dimensional annular shape, and the MEMO3D can preserve physiological annular dynamics in mid-term period postoperatively.

Keywords Mitral valve repair · Annular dynamics · Ring annuloplasty · Saddle shape

Ryomoto M.
Gen Thorac Cardiovasc Surg 2017 Nov;65(11):627-632



2

"In this study, we investigated mitral annular dynamics after implantation of three different annuloplasty rings...a rigid saddle-shaped ring (RSR), a semi-rigid ring (Physio II)and a semi-flexible ring (MEMO 3D) at the postoperative mid-term period by ECG-gated three-dimensional computer tomography..."

"In the mid-term period postoperatively, the MEMO3D ring (semi-flexible ring) was able to preserve one of the mitral annular dynamics, folding dynamics. However, no annular dynamics were observed with the Physio II and RSR."

"The authors mentioned that the anterior annulus is displaced away from the least-squares annular plane fitted to the posterior annulus toward the left atrium. This is effective in preventing left ventricular out-flow obstruction in the end systolic phase. We have previously reported that folding dynamics were preserved immediately after mitral annuloplasty with the MEMO3D."

"The MEMO3D might be able to maintain durability of repair after the operation."

A Comparison of 2 Mitral Annuloplasty Rings for Severe Ischemic Mitral Regurgitation: Clinical and Echocardiographic Outcomes

ORIGINAL SUBMISSION

A Comparison of 2 Mitral Annuloplasty Rings for Severe Ischemic Mitral Regurgitation: Clinical and Echocardiographic Outcomes

Khalil Fattouch, MD, PhD,[,†] Marco Moscarelli, MD, PhD,[‡,§] Sebastiano Castrovinci, MD,[*] Francesco Guccione, MD, PhD,[*] Pietro Dioguardi, MD,[*] Giuseppe Speziale, MD, PhD,[‡] and Patrizio Lancellotti, MD, PhD[¶,#]*

Controversies regarding the choice of annuloplasty rings for treatment of ischemic mitral regurgitation still exist. Aim of the study is to compare early performance of 2 different rings in terms of rest and exercise echocardiographic parameters (transmitral gradient, systolic pulmonary artery pressure, and mitral valve area), clinical outcomes, and recurrence of mitral regurgitation. From January 2008 till December 2013, prospectively collected data of patients who underwent coronary artery bypass grafting and undersizing mitral valve annuloplasty for severe chronic ischemic mitral regurgitation at our Institution were reviewed. A total of 93 patients were identified; among them 44 had semirigid Memo 3D ring implanted (group A) whereas 49 had a rigid profile 3D ring (group B). At 6 months, recurrent ischemic mitral regurgitation, equal or more than moderate, was observed in 4 and 6 patients in the group A and B, respectively ($P = 0.74$). Group A showed certain improved valve geometric parameters such as posterior leaflet angle, tenting area, and coaptation depth. Transmitral gradient was significantly higher at rest in the group B ($P < 0.0001$). During exercise, significant increase of transmitral gradient and systolic pulmonary artery pressure was observed in group B ($P < 0.0001$). Mitral valve area was not statistically significantly smaller at rest in between groups ($P = 0.09$); however, it significantly decreased with exercise in group B ($P = 0.01$). At midterm follow-up, patients in group B were more symptomatic. In patients with chronic ischemic mitral regurgitation, use of semirigid Memo 3D ring when compared to the rigid Profile 3D may be associated with early improved mitral valve geometrical conformation and hemodynamic profile, particularly during exercise. No difference was observed between both groups in recurrent mitral regurgitation.

Semin Thoracic Surg 28:261–268 © 2016 Elsevier Inc. All rights reserved.

Keywords: Mitral Regurgitation (MR), Ischemic mitral regurgitation (IMR), Mitral Valve Repair (MVR), Coronary artery bypass grafting (CABG)

Changes in mean trans-mitral gradient after surgery and at 6 months follow-up.

Central Message

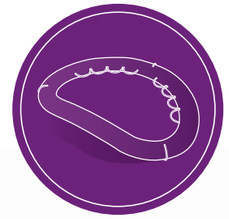
The semirigid annuloplasty ring may show better early performance than a rigid saddle-shape ring in hemodynamic profile at rest and with exercise. No effect of recurrent MR was found.

Perspective Statement

In a context of chronic ischemic mitral regurgitation, the use of a semirigid ring (memo 3D) can be associated with early improved rest and stress echocardiographic parameters and reduced NYHA class at midterm follow-up. However, it does not add benefits in reduction of recurrent mitral regurgitation when compared with a rigid ring.

See Editorial Commentary pages 269-270.

Fattouch K.
Semin Thorac Cardiovasc Surg 2016 Summer;28(2):261-268



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"...it has been reported that restrictive MVA could be associated with impaired hemodynamic profile with higher transmitral gradient and systolic pulmonary artery pressure (PAP) at exercise and worsening in functional New York Heart Association (NYHA) class."

"Main aim of this study is to compare early performance of a semirigid and a saddle-shaped rigid annuloplasty rings at rest and with exercise in patients with IMR undergoing restrictive MVA associated with coronary artery bypass surgery and to assess midterm clinical status."

"In our study, the semirigid Memo 3D annuloplasty ring was associated with a better hemodynamics (lower transmitral pressure gradient and systolic PAP) at rest and during exercise and clinical status (lower NYHA functional class)."

"These data suggest that the semi-rigid Memo 3D annuloplasty ring has less potential risk of postoperative functional stenosis. This could possibly be related to a structural advantage of this ring that is capable to mimicking the normal motion of the annulus, which preserves both the anteroposterior movement and folding dynamics."

Annular dynamics after mitral valve repair with different prosthetic rings: A real-time three-dimensional transesophageal echocardiography study

Surg Today
DOI 10.1007/s00595-015-1279-z

CrossMark

ORIGINAL ARTICLE

Annular dynamics after mitral valve repair with different prosthetic rings: A real-time three-dimensional transesophageal echocardiography study

Hiroyuki Nishi[1] · Koichi Toda[1] · Shigeru Miyagawa[1] · Yasushi Yoshikawa[1] · Satsuki Fukushima[1] · Masashi Kawamura[1] · Daisuke Yoshioka[1] · Tetsuya Saito[1] · Takayoshi Ueno[1] · Toru Kuratani[1] · Yoshiki Sawa[1]

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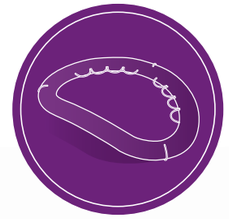
Abstract
Purpose We assessed the effects of different types of prosthetic rings on mitral annular dynamics using real-time three-dimensional echocardiography (RT3DE).
Methods RT3DE was performed in 44 patients, including patients undergoing mitral annuloplasty using the Cosgrove–Edwards flexible band (Group A, $n = 10$), the semi-rigid Sorin Memo 3D ring (Group B, $n = 17$), the semi-rigid Edwards Physio II ring (Group C, $n = 7$) and ten control subjects. Various annular diameters were measured throughout the cardiac cycle.
Results We observed flexible anterior annulus motion in all of the groups except Group C. A flexible posterior annulus was only observed in Group B and the Control group. The mitral annular area changed during the cardiac cycle by 8.4 ± 3.2, 6.3 ± 2.0, 3.2 ± 1.3, and 11.6 ± 5.0 % in Group A, Group B, Group C, and the Control group, respectively. The dynamic diastolic to systolic change in mitral annular diameters was lost in Group C, while it was maintained in Group A, and to a good degree in Group B. In comparison to the Control group, the mitral annulus shape was more ellipsoid in Group B and Group C, and more circular in Group A.
Conclusion Although mitral regurgitation was well controlled by all of the types of rings that were utilized in the present study, we demonstrated that the annulus motion and annulus shape differed according to the type of prosthetic ring that was used, which might provide important information for the selection of an appropriate prosthetic ring.

Keywords Mitral valve repair · Prosthetic ring · Annulus · Real-time three-dimensional transesophageal echocardiography

Nishi H.
Surg Today 2016 Sep;46(9):1083-90



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"In this study, we assessed the mitral annular motion and remodeling after mitral valve repair with a flexible band [...] and two types of semi-rigid rings [...] and the native annulus in control patients with normal mitral valves. The dynamics of the mitral annulus were assessed using intraoperative immediate transesophageal full-volume RT3DE."

"This represents one of the first studies to fully assess the changes in the mitral annulus before and after MV repair in addition to evaluating the influence of different types of prosthetic rings on these dynamics in a controlled clinical setting..."

"Our study demonstrates that this annuloplasty ring is able to remodel ... and support the annulus in its systolic shape like other semi-rigid rings, both in terms of the AP to CC ratio and the saddle-shaped configuration [...]. Nonetheless, this type of semi-rigid ring is also able to maintain major annular dynamics—almost to the same degree as a flexible mitral annuloplasty system. This finding is interesting because other semi-rigid annuloplasty rings did not show this type of flexibility in the present study."

"Based on our results, we believe that the preservation of the natural MV saddle shape and the D-shaped configuration should be pursued when selecting the most appropriate annuloplasty ring, along with the preservation of the diastolic changes (as suggested by recent studies)."

Comparison of saddle-shape flexibility and elliptical-shape stability between Cosgrove-Edwards and Memo-3D annuloplasty rings using three-dimensional analysis software

Gen Thorac Cardiovasc Surg (2016) 64:325–332
DOI 10.1007/s11748-016-0645-0

CrossMark

ORIGINAL ARTICLE

Comparison of saddle-shape flexibility and elliptical-shape stability between Cosgrove-Edwards and Memo-3D annuloplasty rings using three-dimensional analysis software

Akira Tsuneto[1] · Kiyoyuki Eishi[2] · Takashi Miura[2] · Kazuyoshi Tanigawa[2] · Seiji Matsukuma[2] · Takako Minami[1] · Yuji Koide[1] · Satoshi Ikeda[1] · Hiroaki Kawano[1] · Koji Maemura[1]

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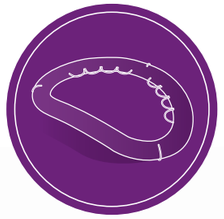
Abstract
Objective To compare three-dimensional dynamics between implanted Cosgrove-Edwards and Sorin Memo-3D annuloplasty rings during the cardiac cycle.
Methods We examined 11 Cosgrove-Edwards rings and 20 Sorin Memo-3D rings after mitral plasty using real-time three-dimensional transesophageal echocardiography. We evaluated ring height, ellipticity, and geometry during one cardiac cycle. Four evenly spaced phases each selected during systole and diastole were assessed using REAL VIEW software.
Results The height of the Cosgrove-Edwards and Sorin Memo-3D rings was similar (2.3 ± 0.8 vs. 1.9 ± 0.9 mm, $p = 0.44$). The maximum difference in ring height during one cardiac cycle (change in height) was larger for the Cosgrove-Edwards than the Sorin Memo-3D rings (2.3 ± 0.8 vs. 1.5 ± 0.6 mm, $p = 0.014$). Ellipticity and the maximum difference in ellipticity during one cardiac cycle (change in ellipticity) were larger for Cosgrove-Edwards than Sorin Memo-3D rings (80.0 ± 9.1 vs. 72.0 ± 4.8 %, $p = 0.014$, respectively, and 12.0 ± 3.1 vs. 6.0 ± 1.8 %, $p < 0.001$).
Conclusions Cosgrove-Edwards rings were more flexible, whereas Sorin Memo-3D rings maintained the elliptical shape more effectively.

Keywords Cosgrove-Edwards annuloplasty ring · Memo-3D annuloplasty ring · Three-dimensional transesophageal echocardiography · Mitral annular dynamics · Mitral repair

Tsuneto A.
Gen Thorac Cardiovasc Surg 2016 Jun;64(6):325-32



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"A comparison of 3D-geometric changes between implanted Cosgrove Memo-3D rings during one cardiac cycle using 3D-TEE after mitral plasty revealed that the Cosgrove ring was more flexible, whereas the Memo-3D ring maintained the elliptical shape more effectively."

"...Memo-3D can distort to fit the original mitral annulus after implantation because the Memo-3D is flat and planar before implantation."

"...Memo-3D ring was more elliptical than the Cosgrove ring and thus might help to maintain coaptation of the mitral leaflets during systole."

"Collectively, rings with optimal stability and a flexible saddle shape should be ideal. From this perspective, a 'semi-rigid' ring might be preferable."

Three-Year Results of Repaired Barlow Mitral Valves via Right Minithoracotomy versus Median Sternotomy in a Randomized Trial

Original Research – Clinical Trial Design

CARDIOLOGY

Cardiology 2014;128:97–105
DOI: 10.1159/000357263

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Three-Year Results of Repaired Barlow Mitral Valves via Right Minithoracotomy versus Median Sternotomy in a Randomized Trial

Giuseppe Nasso[a] Raffaele Bonifazi[a] Vito Romano[a] Francesco Bartolomucci[b] Giuseppe Rosano[d] Francesco Massari[e] Khalil Fattouch[f] Giuseppe Del Prete[a] Graziano Riccioni[g] Mauro Del Giglio[c] Giuseppe Speziale[a]

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For editorial comment see p. 95

Key Words
Mitral valve repair · Minimally invasive surgery · Follow-up

Abstract
Objectives: To clarify whether the results of repair of a complex mitral lesion (Barlow valve) at the intermediate-term follow-up are independent of the mode of surgical access [minithoracotomy vs. median sternotomy (MS)]. ***Methods:*** In a prospective randomized study of mitral repair for Barlow disease using either a minimally invasive (MI) approach or MS, we achieved an average follow-up of 3 years (echocardiography, physical examination and quality of life). Mitral repair was achieved with polytetrafluoroethylene chordal implantation for both leaflets. ***Results:*** Both groups included 80 patients. Mechanical ventilation time and intensive care unit and hospital stay were shorter in the MI group ($p = 0.01$, $p = 0.013$ and $p = 0.02$, respectively). During the follow-up, 5 patients in each group (6.25%) displayed mild mitral regurgitation, while 2 patients in each group (2.5%) developed recurrent regurgitation graded as at least moderate/severe. The rate of mitral reoperation was 2.5% in the MI group and 1.25% in the MS group ($p = 0.9$). The overall follow-up mortality was 3.75% in both the MI and the MS groups. ***Conclusions:*** The 3-year results of repair of Barlow valves were satisfactory irrespective of the approach used to repair the valve. The advantages of MI surgery can be achieved in patients with mitral Barlow disease without concerns over the durability of repair.

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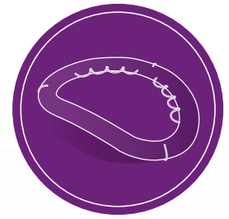
Nasso G.
Cardiology 2014;128:97–105



6

"The method for repairing Barlow valves has evolved over time from bileaflet resection with sliding plasty to the extensive use of artificial chordal implantation plus ring annuloplasty, without leaflet resection."

"The present data indicate that the durability of the clinical results of mitral repair for Barlow valves is not dependent on the route of surgical access."

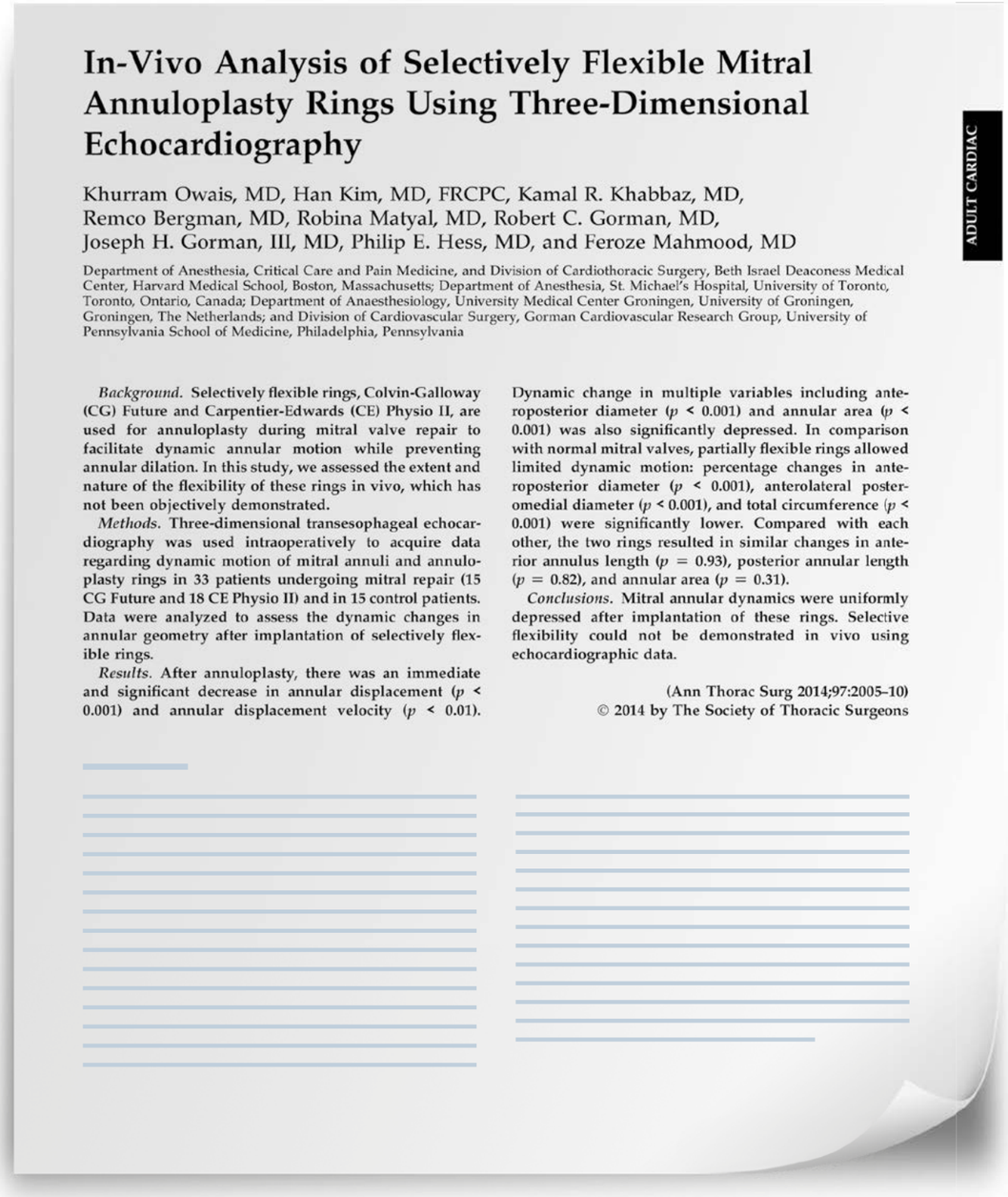
"[...] future studies will need to address whether bileaflet repair with extensive use of artificial chordae may facilitate leaflet restriction in the event of later ventricular dilatation, through excessive correction of chordal elongation. In this scenario, early referral of patients with MR before left ventricular alterations appear is probably even more recommendable; such a strategy is probably justified even in the subgroup of patients with Barlow disease."

"[...] when we examined the QoL parameters at the 6th postoperative month, a statistically better performance in the majority of the domains emerged for the MI group."

"We believe that MI access actually guarantees better exposure of the anterior leaflet [...] This leads to better analysis and facilitated repair of anterior leaflet lesions. Such a feature is particularly appealing when Barlow disease patients need to be treated [...]"

"In most of the cases we used a semirigid remodelling ring able to follow the physiologic movements of the mitral valve (Sorin Memo3D) with the aim of supporting the annulus without compromising its dynamics which can be particularly attractive in these patients."

In-Vivo Analysis of Selectively Flexible Mitral Annuloplasty Rings Using Three-Dimensional Echocardiography



ADULT CARDIAC

In-Vivo Analysis of Selectively Flexible Mitral Annuloplasty Rings Using Three-Dimensional Echocardiography

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Department of Anesthesia, Critical Care and Pain Medicine, and Division of Cardiothoracic Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts; Department of Anesthesia, St. Michael's Hospital, University of Toronto, Toronto, Ontario, Canada; Department of Anaesthesiology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands; and Division of Cardiovascular Surgery, Gorman Cardiovascular Research Group, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania

Background. Selectively flexible rings, Colvin-Galloway (CG) Future and Carpentier-Edwards (CE) Physio II, are used for annuloplasty during mitral valve repair to facilitate dynamic annular motion while preventing annular dilation. In this study, we assessed the extent and nature of the flexibility of these rings in vivo, which has not been objectively demonstrated.

Methods. Three-dimensional transesophageal echocardiography was used intraoperatively to acquire data regarding dynamic motion of mitral annuli and annuloplasty rings in 33 patients undergoing mitral repair (15 CG Future and 18 CE Physio II) and in 15 control patients. Data were analyzed to assess the dynamic changes in annular geometry after implantation of selectively flexible rings.

Results. After annuloplasty, there was an immediate and significant decrease in annular displacement ($p < 0.001$) and annular displacement velocity ($p < 0.01$). Dynamic change in multiple variables including anteroposterior diameter ($p < 0.001$) and annular area ($p < 0.001$) was also significantly depressed. In comparison with normal mitral valves, partially flexible rings allowed limited dynamic motion: percentage changes in anteroposterior diameter ($p < 0.001$), anterolateral posteromedial diameter ($p < 0.001$), and total circumference ($p < 0.001$) were significantly lower. Compared with each other, the two rings resulted in similar changes in anterior annulus length ($p = 0.93$), posterior annular length ($p = 0.82$), and annular area ($p = 0.31$).

Conclusions. Mitral annular dynamics were uniformly depressed after implantation of these rings. Selective flexibility could not be demonstrated in vivo using echocardiographic data.

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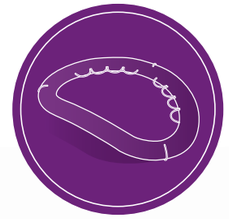
Owais K.
Ann Thorac Surg 2014;97:2005–10



7

"[...] despite manufacturers' claims, flexibility of these rings is relatively limited, especially in the physiologic force range."

"[...] it is plausible that in vivo behaviour of selectively flexible rings is perhaps similar to that of completely rigid rings."

"A "selective" preservation of any specific dimension could not be demonstrated in our in vivo analysis of CG Future and CE Physio II rings using 3D TEE."

"After annuloplasty with selectively flexible rings, dynamic MA behaviour was depressed."

Is Physiologic Annular Dynamics Preserved After Mitral Valve Repair With Rigid or Semirigid Ring?

CME

CARDIOTHORACIC ANESTHESIOLOGY:
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ADULT CARDIAC

Is Physiologic Annular Dynamics Preserved After Mitral Valve Repair With Rigid or Semirigid Ring?

Masaaki Ryomoto, MD, PhD, Masataka Mitsuno, MD, PhD, Mitsuhiro Yamamura, MD, PhD, Hiroe Tanaka, MD, Shinya Fukui, MD, PhD, Noriko Tsujiya, MD, Tetsuya Kajiyama, MD, and Yuji Miyamoto, MD, PhD

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Background. Various rings are available to achieve more physiologic mitral valve repair from viewpoints of physiologic mitral annular structure or dynamics. We evaluated preoperative and postoperative mitral annular structures and dynamics.

Methods. Thirty-six patients underwent mitral valve repair for degenerative mitral insufficiency. Carpentier-Edwards Physio II ring (semirigid [Edwards Lifesciences, Irvine, CA]), St. Jude Medical Rigid Saddle Ring (RSR [St. Jude Medical, St. Paul, MN]), and MEMO 3D ring (semirigid [Sorin SpA, Milan, Italy]) were implanted in 13, 12, and 11 patients, respectively. Intraoperative real-time three-dimensional transesophageal echocardiography was performed before and after repair.

Results. The postoperative anteroposterior diameter reduction rate from end diastole to end systole was significantly ($p < 0.0001$) larger in MEMO (9.58% ± 2.91%) than in Physio II (0.98% ± 1.04%) and RSR (1.94% ± 1.95%). There were no significant differences in the commissure-to-commissure diameter reduction rates among the groups: 0.81% ± 1.98% for Physio II, 0.12% ± 0.53% for RSR, and 0.51% ± 1.98% for MEMO. The postoperative end-systolic annular height commissure width ratio was significantly ($p < 0.0001$) larger in both Physio II (17.9% ± 3.0%) and RSR (18.5% ± 1.6%) than in MEMO (13.6% ± 3.0%). The postoperative annular height commissure width ratio increase rate from end diastole to end systole was significantly larger in MEMO (5.1% ± 2.3%) than in Physio II (0.1% ± 0.6%) and RSR (0.3% ± 0.5%).

Conclusions. Physio II and RSR could restore the physiologic three-dimensional annular shape, but the annular motion was diminished. Conversely, MEMO could preserve both the anteroposterior movement and folding dynamics, but no three-dimensional restoration of the mitral annulus was obtained.

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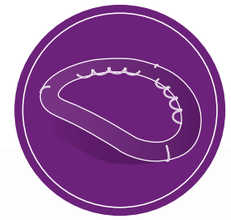
Ryomoto M.
Ann Thorac Surg 2014 Feb;97(2):492-7



"The mitral annular dynamics is also thought to be an important factor after ring implantation. A rigid saddle-shaped or rigid-flat ring allows the mitral annulus to be fixed in any direction throughout the cardiac cycle."

"The MEMO ring is a semirigid complete ring that accommodates the three-dimensional motion of the annulus."

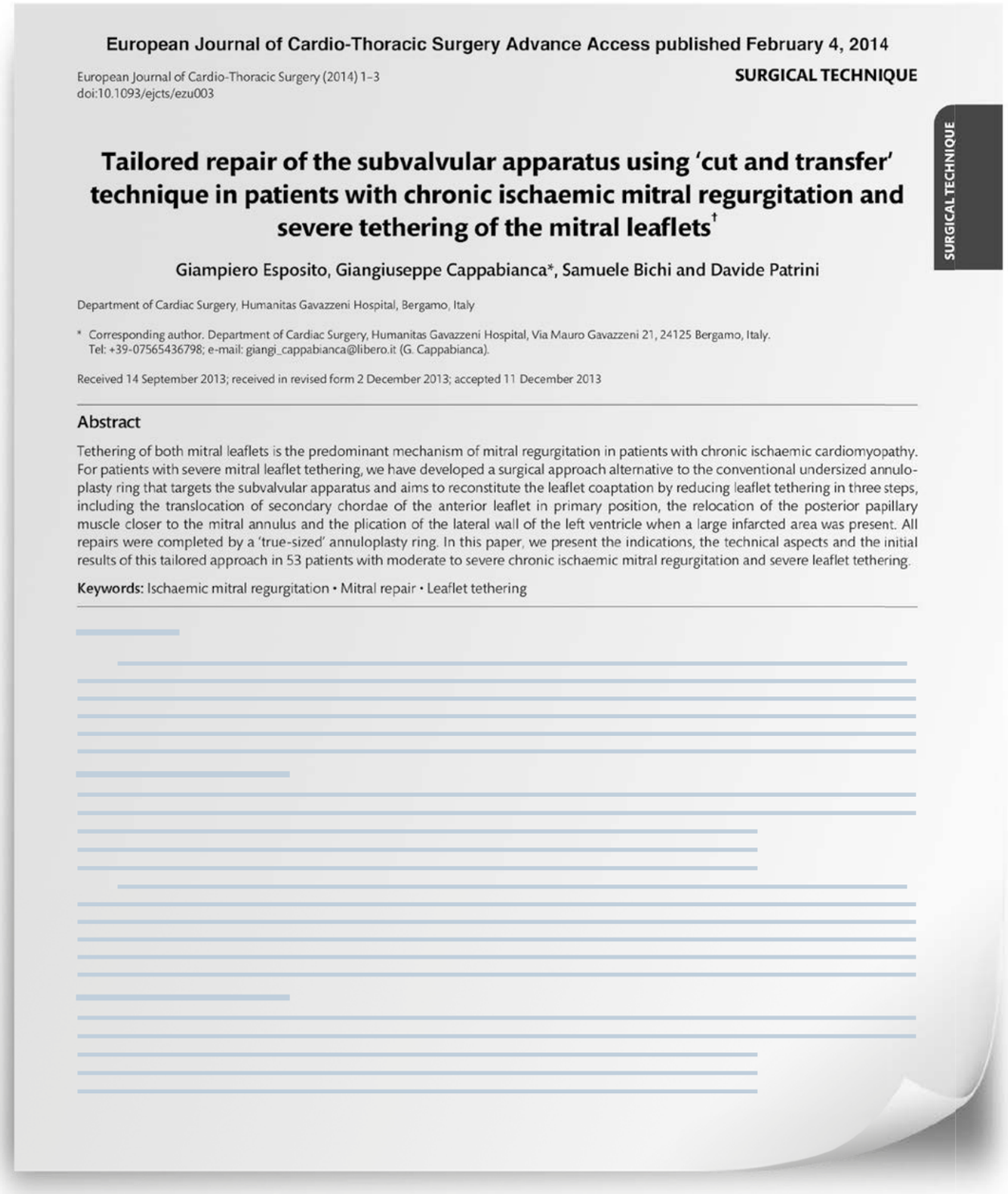
"We also confirmed the annular dynamics in the AP direction in the present study. In addition to this dynamic, we confirmed the folding annular dynamics after MEMO implantation [...]The folding dynamics may also be important for long-term valve function and prevention of left ventricular outflow tract obstruction after annular ring implantation."

"MEMO ring may effectively preserve both the annular dynamics in the AP direction and the folding dynamics in selected cases in whom the preoperative three-dimensional annular shape is relatively preserved"

"A semi-rigid ring that preserves the mitral annular dynamics, such as the MEMO, may be a better choice in cases with preservation of the saddle shape of the mitral annulus and good left ventricular function preoperatively."

"Several hemodynamic benefits of MEMO have been reported. In one paper, good hemodynamics after MEMO implantation was reported. In another report, the contraction toward the AP direction was proven with magnetic resonance imaging at 5 years after MEMO implantation."

Tailored repair of the subvalvular apparatus using 'cut and transfer' technique in patients with chronic ischaemic mitral regurgitation and severe tethering of the mitral leaflets



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SURGICAL TECHNIQUE

SURGICAL TECHNIQUE

Tailored repair of the subvalvular apparatus using 'cut and transfer' technique in patients with chronic ischaemic mitral regurgitation and severe tethering of the mitral leaflets†

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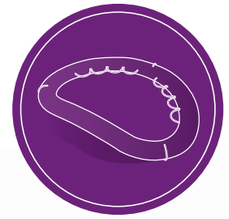
Abstract

Tethering of both mitral leaflets is the predominant mechanism of mitral regurgitation in patients with chronic ischaemic cardiomyopathy. For patients with severe mitral leaflet tethering, we have developed a surgical approach alternative to the conventional undersized annuloplasty ring that targets the subvalvular apparatus and aims to reconstitute the leaflet coaptation by reducing leaflet tethering in three steps, including the translocation of secondary chordae of the anterior leaflet in primary position, the relocation of the posterior papillary muscle closer to the mitral annulus and the plication of the lateral wall of the left ventricle when a large infarcted area was present. All repairs were completed by a 'true-sized' annuloplasty ring. In this paper, we present the indications, the technical aspects and the initial results of this tailored approach in 53 patients with moderate to severe chronic ischaemic mitral regurgitation and severe leaflet tethering.

Keywords: Ischaemic mitral regurgitation • Mitral repair • Leaflet tethering

Esposito G.
Eur J Cardiothorac Surg 2014 Aug;46(2):321-3



9

"Our technique represents an alternative to mitral replacement in patients with severe MLT."

"Moreover, the mitral valve achieves a more physiological and 'bileaflet' appearance compared with undersized annuloplasty repairs."

"The size of the annuloplasty ring was decided measuring the intercommissural distance without undersizing and a complete semirigid ring (Memo 3D, Sorin, Saluggia, Italy) was implanted."

Cut-and-Transfer Technique for Ischemic Mitral Regurgitation and Severe Tethering of Mitral Leaflets

ADULT CARDIAC

Cut-and-Transfer Technique for Ischemic Mitral Regurgitation and Severe Tethering of Mitral Leaflets

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Background. Chronic ischemic mitral regurgitation (MR) denotes abnormal function of normal leaflets resulting from left ventricular enlargement. We present the midterm results of a tailored mitral repair technique using a combination of the following subvalvular procedures: (1) detachment and reimplantation of secondary chordae on the free edge of the anterior leaflet ("cut-and-transfer" technique), (2) relocation of the posterior papillary muscle (PPM) closer to the mitral annulus, and (3) infarct plication on the lateral wall of the left ventricle.

Methods. From 2008 to 2011, 49 patients with moderate to severe ischemic MR underwent coronary surgery plus mitral valve repair using the cut-and-transfer and PPM relocation techniques. All the patients received a "true-sized" semirigid complete annuloplasty ring. In 20 patients, a plication of the lateral wall of the left ventricle was performed to reduce the tethering of the mitral leaflets. The mean number of coronary grafts per patient was 3.4 ± 0.4.

Results. Hospital mortality was 2%. No patient died during 1-year follow-up and New York Heart Association (NYHA) class improved from 3.4 ± 0.5 to 1.4 ± 0.6 ($p < 0.0001$). The 1-year echocardiogram showed the following changes from baseline: mitral regurgitation grade (0–4) 2.9 ± 0.4 versus 0.2 ± 0.4 ($p < 0.0001$), left ventricular end-systolic volume index (mL/m^2) 52.7 ± 13.1 versus 48.2 ± 10.1 ($p = 0.07$), left ventricular end-systolic index (mL/m^2) 92.9 ± 16.5 versus 83.4 ± 15.9 ($p < 0.005$), and ejection fraction (%) 37.8 ± 6.3 versus 44.2 ± 8.1 ($p < 0.0001$).

Conclusions. Both clinical and echocardiographic results show that reducing the tethering of the mitral leaflets with tailored interventions on subvalvular apparatus without undersizing the mitral annulus can safely and effectively correct chronic ischemic MR.

(Ann Thorac Surg 2013;96:1607–13)

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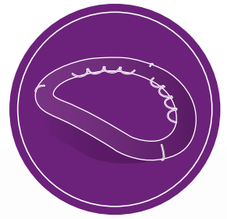
Cappabianca G.
Ann Thorac Surg 2013;96:1607-13



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"We believe that the most innovative concept arising from our study is the possibility of correcting chronic ischemic MR using a true-sized annuloplasty ring and a combination of subvalvular procedures aimed at reducing the functional restriction of the mitral leaflets."

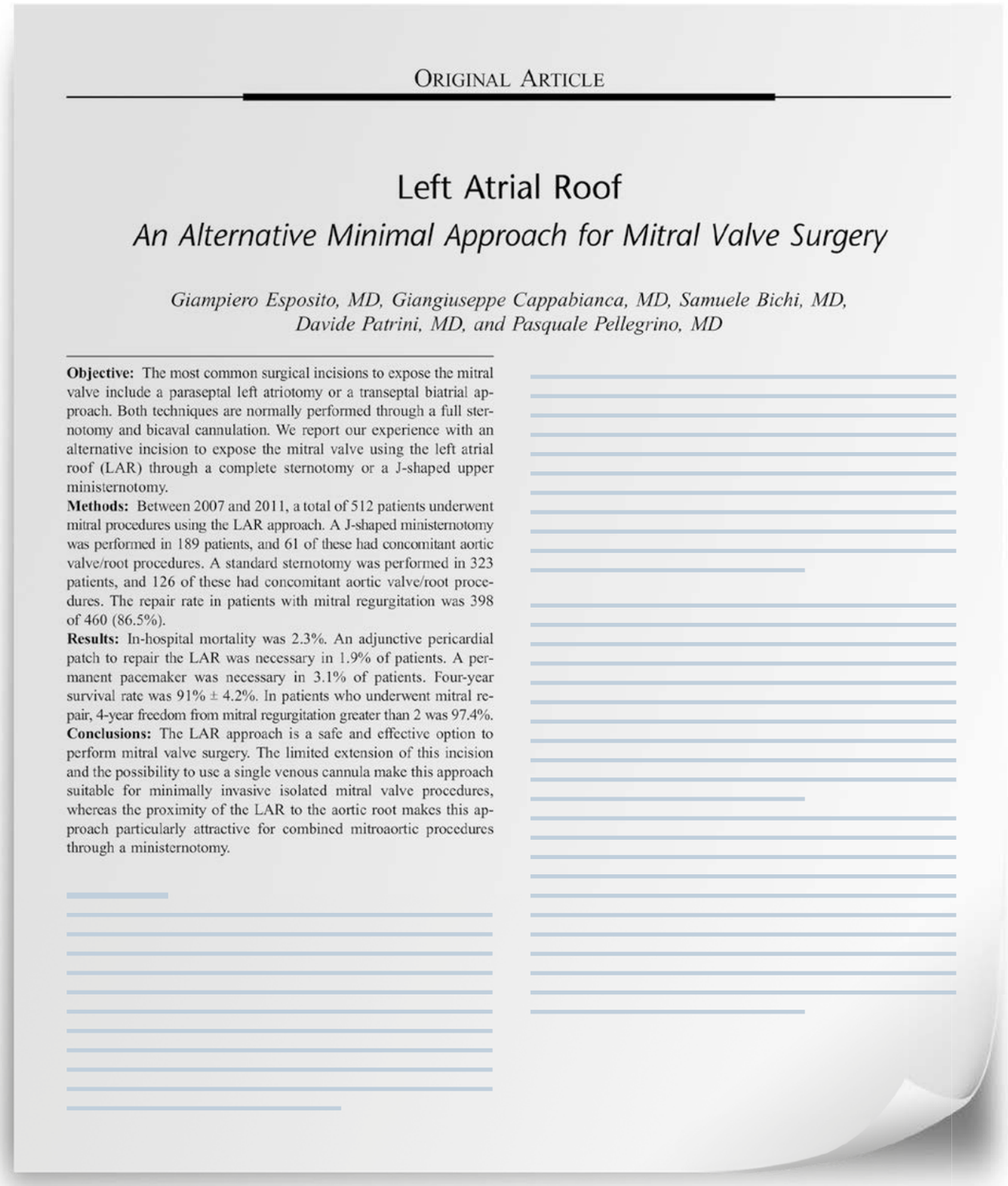
"Our 1-year data suggest not only that this approach is safe and yields good results in terms of survival and symptom improvement but also that echocardiographic data showed a statistically significant left ventricular reverse remodelling [...]."

"[...]" patients with chronic ischemic MR and severe tethering, a tailored intervention on the subvalvular apparatus seems to have effectively reduced the tethering forces on the mitral leaflets and corrected the MR without undersizing the mitral annulus."

All patients received a complete semirigid ring (Memo 3D, Sorin, Saluggia, Italy).

"[...]" the ring was sized according to the manufacturer's guidelines, measuring with the sizer the height of the anterior leaflet and the intercommissural distance. The ring size selected corresponded to the height of the anterior leaflet first and then to the intercommissural distance, and no undersizing was performed."

Left Atrial Roof:
An Alternative Minimal Approach for Mitral Valve Surgery



ORIGINAL ARTICLE

Left Atrial Roof

An Alternative Minimal Approach for Mitral Valve Surgery

Giampiero Esposito, MD, Giangiuseppe Cappabianca, MD, Samuele Bichi, MD, Davide Patrini, MD, and Pasquale Pellegrino, MD

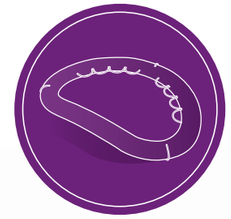
Objective: The most common surgical incisions to expose the mitral valve include a paraseptal left atriotomy or a transeptal biatrial approach. Both techniques are normally performed through a full sternotomy and bicaval cannulation. We report our experience with an alternative incision to expose the mitral valve using the left atrial roof (LAR) through a complete sternotomy or a J-shaped upper ministernotomy.

Methods: Between 2007 and 2011, a total of 512 patients underwent mitral procedures using the LAR approach. A J-shaped ministernotomy was performed in 189 patients, and 61 of these had concomitant aortic valve/root procedures. A standard sternotomy was performed in 323 patients, and 126 of these had concomitant aortic valve/root procedures. The repair rate in patients with mitral regurgitation was 398 of 460 (86.5%).

Results: In-hospital mortality was 2.3%. An adjunctive pericardial patch to repair the LAR was necessary in 1.9% of patients. A permanent pacemaker was necessary in 3.1% of patients. Four-year survival rate was 91% ± 4.2%. In patients who underwent mitral repair, 4-year freedom from mitral regurgitation greater than 2 was 97.4%.

Conclusions: The LAR approach is a safe and effective option to perform mitral valve surgery. The limited extension of this incision and the possibility to use a single venous cannula make this approach suitable for minimally invasive isolated mitral valve procedures, whereas the proximity of the LAR to the aortic root makes this approach particularly attractive for combined mitroaortic procedures through a ministernotomy.

Esposito G.
Innovations (Phila) 2012 Nov-Dec;7(6):417-20



11

"In our opinion, the first advantage of using the LAR approach is the extreme simplicity and rapidity of cardiopulmonary bypass setup that eliminates the technical complexity of the minithoracotomy approach."

"The access and visualization of the subvalvular apparatus were also very good, with the LAR approach al-lowing to perform complex repair on the chordae and papillary muscles in patients with ischemic mitral regurgitation."

"A mitral repair or replacement was performed as planned. In all the mitral repairs, a complete semirigid ring (Memo 3D, Sorin Group, Saluggia, Italy) was implanted."

Current Trends in Mitral Valve Repair Techniques in North America

Current Trends in Mitral Valve Repair Techniques in North America

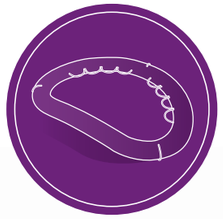
Vibhu R. Kshettry[1], Sary F. Aranki[2]

[1]*Minneapolis Heart Institute and Foundation, Minneapolis,* [2]*Brigham and Women's Hospital, Division of Cardiac Surgery, Boston, USA*

Background and aim of the study: The current trends in the surgical technique of mitral valve repair (MVR) among North American medical centers participating in the Sorin Valve Repair Registry are described.
Methods: A total of 2,314 MVR procedures was performed and documented between 2003 and 2009 at 89 North American medical centers. Surgical procedure characteristics on all mitral valve annuloplasty and valve reconstructions were collected by participating surgeons, and documented in the registry.
Results: Early in the reporting period (between 2003 and 2007), posterior leaflet resection comprised 60% of all MVR procedures, but the percentage declined systematically through the years 2008 (56.1%) and 2009 (50.4%). A decrease over time was also observed in the frequency of sliding valvuloplasty procedures (from ~30% in 2003 to 4.0% in 2009). Proportions of chordal repair techniques tended to increase towards the end of the reporting period, from a low of 15% in 2003 to a peak of 32% in 2008.
Conclusion: This report documents important trends in current MVR techniques among a representative cohort of surgical centers across North America. The data obtained were consistent with a practical shift from the conventional surgical MVR techniques to methods that allow a greater leaflet preservation - and thus less resection - over the latter half of the reporting period.

The Journal of Heart Valve Disease 2012;21:690-695

Kshettry V. R.
The Journal of Heart Valve Disease 2012;21:690-695



"The present data support current surgical trends in the practice of modern mitral valve repair."

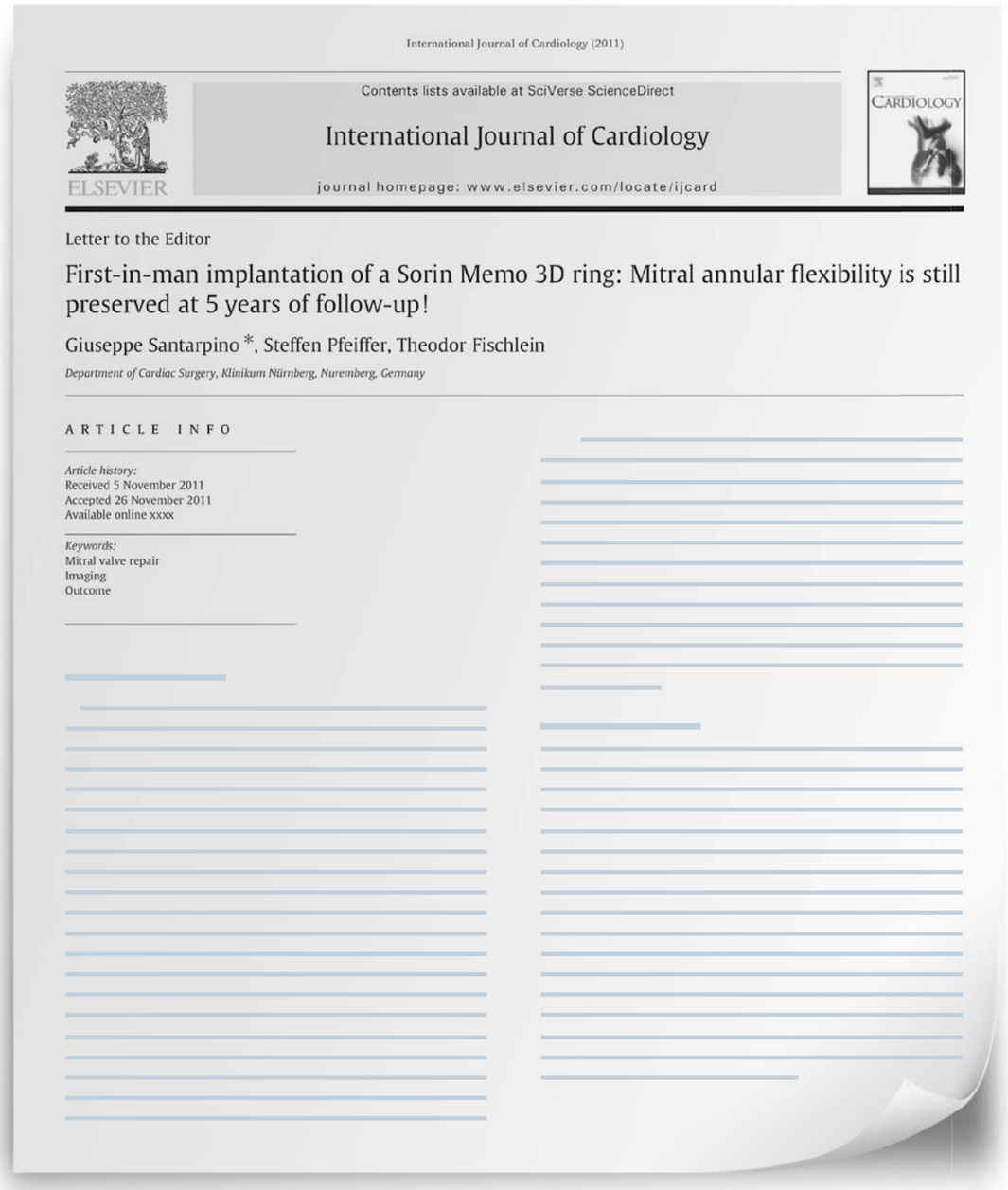
"Anterior leaflet prolapse can be similarly addressed with less resection and the insertion of artificial chordae. These modifications have been supported by improvements in valvular function and long-term durability."

"Thus, a shift from classical Carpentier approaches (resection with sliding plasty, quadrangular resection) to more current, limited resection procedures and the use of artificial chords, appeared to be observed during the current study."

"The results of the present study suggested that surgical reconstruction is beginning to advance into older, and perhaps more complicated, patients."

"[...] appeared to be a significant shift from conventional mitral valve repair techniques to techniques that would require less resection, and consequently may reflect a greater leaflet preservation over time."

First-in-man implantation of a Sorin Memo 3D ring: Mitral annular flexibility is still preserved at 5 years of follow-up!



International Journal of Cardiology (2011)

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Letter to the Editor

First-in-man implantation of a Sorin Memo 3D ring: Mitral annular flexibility is still preserved at 5 years of follow-up!

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Santarpino G.
Int J Cardiol 2012 Aug 23;159(2):e23-4

"[...] Flexibility of the Sorin Memo 3D annular ring was maintained at 67-month follow-up, as documented in our antero-posterior RM images."

"[...] The preservation of the physiological valvular function by means of an implanted annuloplasty ring should be pursued when selecting the most appropriate model for the individual patient."

Results of mitral valve repair for barlow disease (bileaflet prolapse) via right minithoracotomy versus conventional median sternotomy: A randomized trial

Results of mitral valve repair for Barlow disease (bileaflet prolapse) via right minithoracotomy versus conventional median sternotomy: A randomized trial

Giuseppe Speziale, MD,[a] Giuseppe Nasso, MD,[a] Giampiero Esposito, MD,[b] Massimiliano Conte, MD,[b] Ernesto Greco, MD,[c] Khalil Fattouch, MD,[d] Flavio Fiore, MD,[a] Mauro Del Giglio, MD,[c] Roberto Coppola, MD,[a] and Luigi Tavazzi, MD[e]

Objective: The results of mitral repair for complex Barlow valves are adequate and support earlier intervention. It is unknown whether these results are reproducible in the context of minimally invasive surgery via right minithoracotomy.

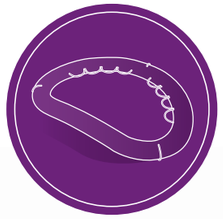
Methods: We randomized patients with Barlow mitral disease (bileaflet prolapse) to have conventional open repair via median sternotomy (MS group) or minimally invasive (MI group) repair. Repair was done using polytetrafluoroethylene chordal reimplantation for both leaflets. In the MI group, we adopted right minithoracotomy, peripheral cannulation, external aortic clamping, and surgery under direct vision.

Results: Both groups comprised 70 patients. The operative and the cardiopulmonary bypass times were significantly longer in the MI group ($P = .003$ and $P = .012$). Mitral repair was successful in 98.5% MI patients and 100% MS patients. Operative mortality was comparable. The mean mechanical ventilation time, intensive care unit stay, and hospital stay were lower in the MI group ($P = .014$, $P = .02$, and $P = .03$,). Mean pain score was lower in the MI group at postoperative days 2 and 4. At follow-up, the freedom from moderate (2+) or severe (3+ or 4+) mitral regurgitation was 98% versus 97% ($P = .9$). Two patients underwent reoperation (1 in each group) for late failure of repair. The Kaplan–Meier analysis confirmed these results.

Conclusions: Our data indicate that the optimal standard-of-care results of mitral repair for complex disease (Barlow) are reproducible in the minimally invasive settings through right minithoracotomy and direct vision. The minimally invasive technique can be proposed for complex mitral disease and early referral of these patients can be encouraged. (J Thorac Cardiovasc Surg 2011;142:77-83)

ACD

Speziale G.
J Thorac Cardiovasc Surg 2011 Jul;142(1):77-83



"[...] Our data indicate that the repair of the severely regurgitant Barlow valve is feasible and reproducible through the minithoracotomy access [..]"

"[...] the reduced postoperative pain, facilitated recovery, and cosmetic advantages support a more liberal application of the MI technique [...]"

"[...] The implantation of a ring was a constitutive part of our standardized surgical technique. In addition to ring annuloplasty, as an institutional policy we routinely treated bileaflet prolapse with chordal reimplantation without performing extensive leaflet resections. Such strategy is aimed at increasing the coaptation area and the coaptation line and at reducing the extent of the prolapse by increasing the coaptation depth."

Early Clinical Experience and Echocardiographic Results with a New Semirigid Mitral Annuloplasty Ring: The Sorin Memo 3D

ADULT CARDIAC

Early Clinical Experience and Echocardiographic Results With a New Semirigid Mitral Annuloplasty Ring: The Sorin Memo 3D

Pier Giorgio Bruno, MD, PhD, Cristian Leva, MD, PhD, Luisa Santambrogio, MD, PhD, Ilaria Lazzarini, MD, Giorgio Musazzi, MD, Gianfranco Del Rosso, MD, and Germano Di Credico, MD

Departments of Cardiac Surgery, Anesthesia and Critical Care, and Cardiology, Echocardiography Unit, Ospedale Civile di Legnano, Milan, Italy

Background. The Sorin Memo 3D (Sorin Biomedica Cardio S.r.L., Saluggia, Italy) is a new, complete semirigid annuloplasty ring. Clinical use, outcomes, and echocardiographic results are reported as an evaluation of its safety and efficacy in the treatment of mitral valve regurgitation (MVR).

Methods. This device was assessed in 63 patients (63.5% men; mean age, 70.2 ± 10.3 years) who underwent MVR operations between January 2007 and June 2008. Functional classification was normal leaflet motion (type I; 1.6%), leaflet prolapse (type II; 66.7%), and restricted leaflet motion (type III; 31.7%). Valve disease was degenerative (68.25%), ischemic (25.4%), and nonischemic dilated cardiomyopathy (6.35%).

Results. Early mortality (≤30 days) was 3.3% (2 patients). Late mortality (11.2 ± 5.1 months) was 4.9% (3 patients). No deaths were device-related. Thromboembolic stroke occurred in 3.3% and endocarditis in 1.6%. Freedom from reoperation was 98.4%. At 6 months, MVR was grade 0/1 in 93.7% and grade 2+ in 6.4%. Left end-diastolic ventricular diameters decreased significantly from 59.3 ± 6.9 mm preoperatively to 50.6 ± 12.2 mm at 6 months, pulmonary arterial pressure decreased from 44.8 ± 7.1 mm Hg to 38.4 ± 5.5 mm Hg, and left ventricular ejection fraction increased significantly from 0.469 ± 0.129 to 0.582 ± 0.106. New York Heart Association functional class was I in 81% and II in 13.8%.

Conclusions. Early results indicate the Sorin Memo 3D ring safely and effectively minimizes secondary MVR resulting from all causes and preserves mitral annular flexibility and function at follow-up.

(Ann Thorac Surg 2009;88:1492–8)

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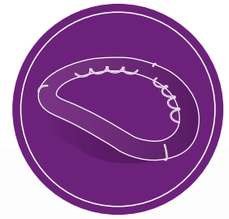
Bruno P. G.
Ann Thorac Surg 2009 Nov;88(5):1492-8



15

"The new Sorin Memo 3D (Sorin Biomedica Cardio S.r.L., Saluggia, Italy) is a complete semirigid annuloplasty ring intended to adapt to the physiologic dynamism of the annulus and to restore the geometric relation between the leaflets and the annulus."

"The ring is flexible, accommodating to the 3-dimensional (3D) motion of the annulus. Its shape memory and the nitinol alloy core are designed to restore the natural systolic diameter ratio. To support remodelling, the flexibility is maximal in the posterior curved portion and gradually decreases toward the anterior linear segment. The transversal flexibility allows for contractility of the corresponding part of the annulus, and the longitudinal rigidity avoids plication and a pursestring effect when tying the sutures. The selective rigidity in the anterior section is expected to significantly reduce stress on the sutures while simultaneously maintaining the annulus remodelling effect."

"The design of the Sorin Memo 3D ring could bring together the necessary flexibility for the preservation of the saddle shape of the annulus with the adequate consolidated support for the entire mitral annulus. The Sorin Memo 3D permits periodic changes in size and shape throughout the cardiac cycle. It allows for contraction during systole, an increased depth of coaptation of the leaflets, and an improvement in annular orifice area during diastole."

"The proposed superior engineering of the ring is supported by our preliminary 3D echocardiographic results, which demonstrate significant systolicdiastolic changes of both septal-lateral and anteriorposterior dimensions."

"Carpentier and colleagues suggested that the low incidence of thromboembolism in their series was due to the low transvalvular gradients and large valve orifice area (mean, 3.55 cm2) achieved with the Carpentier-Edwards Physio Annuloplasty Ring (Baxter- Edwards Laboratories, Irvine, CA). Similar mitral valve areas (mean, 4.1 cm2) were obtained in the present study."

“RECHORD” CHORDAL GUIDING SYSTEM CLINICAL EVIDENCE

1. **Initial Experience With a New Mitral Ring Designed to Simplify Length Determination of Neochords**
   Prinzing A.
   Ann Thorac Surg 2018 Jun;105(6):1784-1789
2. **Mitral Valve Repair Using a Prosthetic Ring With Chordal Sizing System: a Modified Technique in the Presence of Myxomatous Leaflets**
   Lio A.
   European Journal of Cardio-Thoracic Surgery 52 (2017) 820–822
3. **Mitral valve repair using a semirigid ring: patient selection and early outcomes**
   Wan S.
   Asian Cardiovasc Thorac Ann 2016 Sep;24(7):647-52
4. **Minimally invasive mitral valve repair using a semi-rigid annuloplasty ring with a new chordal sizing system: the Memo3D ReChord**
   Glauber M.
   Ann Cardiothorac Surg 2015 May;4(3):298-300

Initial Experience With a New Mitral Ring Designed to Simplify Length Determination of Neochords

ADULT CARDIAC

Initial Experience With a New Mitral Ring Designed to Simplify Length Determination of Neochords

Check for updates

Anatol Prinzing, MD, Sabine Bleiziffer, MD, PhD, Markus Krane, MD, PhD, and Ruediger Lange, MD, PhD

Department of Cardiovascular Surgery, German Heart Centre Munich, Technical University Munich, Munich; and Deutsches Zentrum für Herz-Kreislauf-Forschung (German Center for Cardiovascular Research)—partner site Munich Heart Alliance, Munich, Germany

Background. Artificial chord implantation has become one of the most applied techniques for mitral valve repair (MVR). Many techniques have been described, with the goal of optimizing neochord implantation. A new annuloplasty device designed to simplify the determination of the appropriate neochord length has been recently introduced. We describe our initial experience with this new device.

Methods. The semirigid device is equipped with removable loops on the posterior aspect of the ring. Neochords are tied to the loops, which are subsequently removed. The device was implanted in 47 symptomatic patients from January 2015 to August 2016 through a median sternotomy in 33 patients (70.2%) and a right anterolateral minithoracotomy in 14 (29.8%). The cause of mitral valve insufficiency was degenerative in all patients, and most patients presented with isolated prolapse of the posterior leaflet. Before and after cardiopulmonary bypass, all patients underwent evaluation with transesophageal echocardiography, and transthoracic echocardiography was performed at discharge.

Results. A median of 2 neochords were implanted (minimum, 1; maximum, 6). Mean cardiopulmonary bypass time and aortic cross-clamp times were 141.7 ± 32.3 and 104.8 ± 28.5 minutes for combined and 133 ± 53.9 and 98.3 ± 41.6 minutes for isolated MVR. At discharge, echocardiography revealed no or only mild mitral insufficiency in 45 patients (mean gradient, 2.9 ± 1.3 mm Hg).

Conclusions. This new annuloplasty ring facilitated determination of appropriate neochord length and was used to successfully treat different degenerative pathologies affecting both leaflets. This new device simplified length determination of the neochords.

(Ann Thorac Surg 2018;105:1784–9)

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Prinzing A.
Ann Thorac Surg 2018 Jun;105(6):1784-1789

1

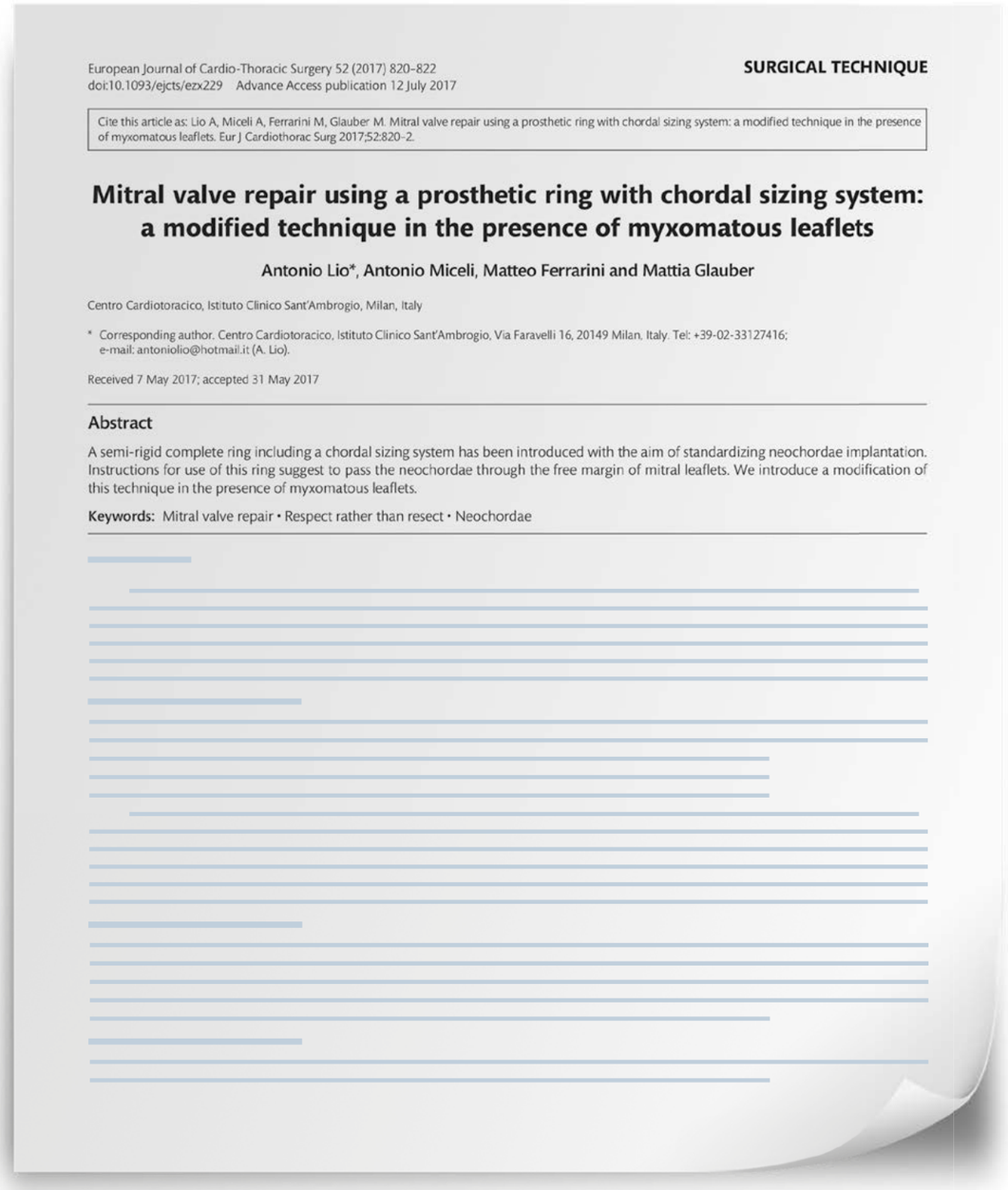
"Based on our preliminary experience with this new ring device, length determination of neochords was feasible in all patients using the loops on the posterior aspect of the annuloplasty ring as the reference point."

"Our preliminary experience showed this annuloplasty device was effective, and correct determination of length could be performed in most patients."

"In conclusion, this new annuloplasty ring with its chordal guiding system facilitates determination of appropriate neochord length by enabling tying at the annular level.

In our initial series of 47 patients, this device could be efficiently used to treat different degenerative pathologies affecting both leaflets."

Mitral Valve Repair Using a Prosthetic Ring With Chordal Sizing System: a Modified Technique in the Presence of Myxomatous Leaflets



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SURGICAL TECHNIQUE

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Mitral valve repair using a prosthetic ring with chordal sizing system: a modified technique in the presence of myxomatous leaflets

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Abstract

A semi-rigid complete ring including a chordal sizing system has been introduced with the aim of standardizing neochordae implantation. Instructions for use of this ring suggest to pass the neochordae through the free margin of mitral leaflets. We introduce a modification of this technique in the presence of myxomatous leaflets.

Keywords: Mitral valve repair • Respect rather than resect • Neochordae

Lio A.
European Journal of Cardio-Thoracic Surgery 52 (2017) 820–822

2

"The chordal guide system of the ReChord was designed to simplify implantation of PTFE chordae, standardizing the 'respect rather than resect' technique relying on the principle of basal marginal chordae equivalence."

"[ReChord] instructions for use suggest to pass the neochordae through the free margin of mitral leaflets after anchoring them to the papillary muscles."

"Our modification aims to avoid the risk of oversizing the length of neochordae in the presence of myxomatous leaflets prolapsed."

"In our opinion, in these cases, the reference point for PTFE chordae placement must be the coaptation surface of mitral leaflets and not the free margin. Only with this modification, the neochordae will match the plane of the native annulus, reducing the risk of oversizing."

Mitral valve repair using a semirigid ring: patient selection and early outcomes

Original Article

ASIAN CARDIOVASCULAR & THORACIC ANNALS

Asian Cardiovascular & Thoracic Annals
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Mitral valve repair using a semirigid ring: patient selection and early outcomes

Song Wan[1], Alex PW Lee[2], Saina Attaran[1], Peter SY Yu[1], Sylvia SW Au[3], Micky WT Kwok[1], Rainbow WH Lau[1], Randolph HL Wong[1], Innes YP Wan[1], Siu-Keung Ng[3] and Malcolm J Underwood[1]

Abstract

Background: Commonly used complete mitral annuloplastic rings include saddle-shaped and semirigid rings, with no clear indication for either type. A semirigid ring may be preferred in patients whose native mitral saddle shape is well maintained. We present our experience of using semirigid rings for mitral valve repair.

Methods: We routinely measured the annular height-to-commissural width ratio by 3-dimensional transesophageal echocardiography prior to mitral repair. We generally chose a semirigid (Memo 3D) ring in patients whose annular height-to-commissural width ratio was normal (⩾ 15%). The same semirigid ring with an additional chordal guiding system (Memo 3D ReChord) was selected for patients with anterior leaflet or bileaflet pathology. Over an 18-month period, 66 patients with severe degenerative ($n = 60$) or functional ($n = 6$) mitral regurgitation had Memo 3D ($n = 32$) or Memo 3D ReChord ($n = 34$) rings implanted.

Results: Postoperative 3-dimensional transesophageal echocardiography was completed in all patients (mean follow-up 7 ± 5 months). The majority of patients had no or mild residual mitral regurgitation; only two had moderate (2+) mitral regurgitation. There was no mortality at 30-days or on midterm follow-up.

Conclusions: Our series represents the first Asian clinical experience using the Memo 3D ReChord ring. Although the long-term durability of mitral repair with this type of semirigid annuloplastic ring warrants further validation, our current clinical data are encouraging.

Keywords

Echocardiography, three-dimensional, Mitral valve, Mitral valve annuloplasty, Mitral valve insufficiency, Prosthesis design

Wan S.

Asian Cardiovasc Thorac Ann 2016 Sep;24(7):647-52

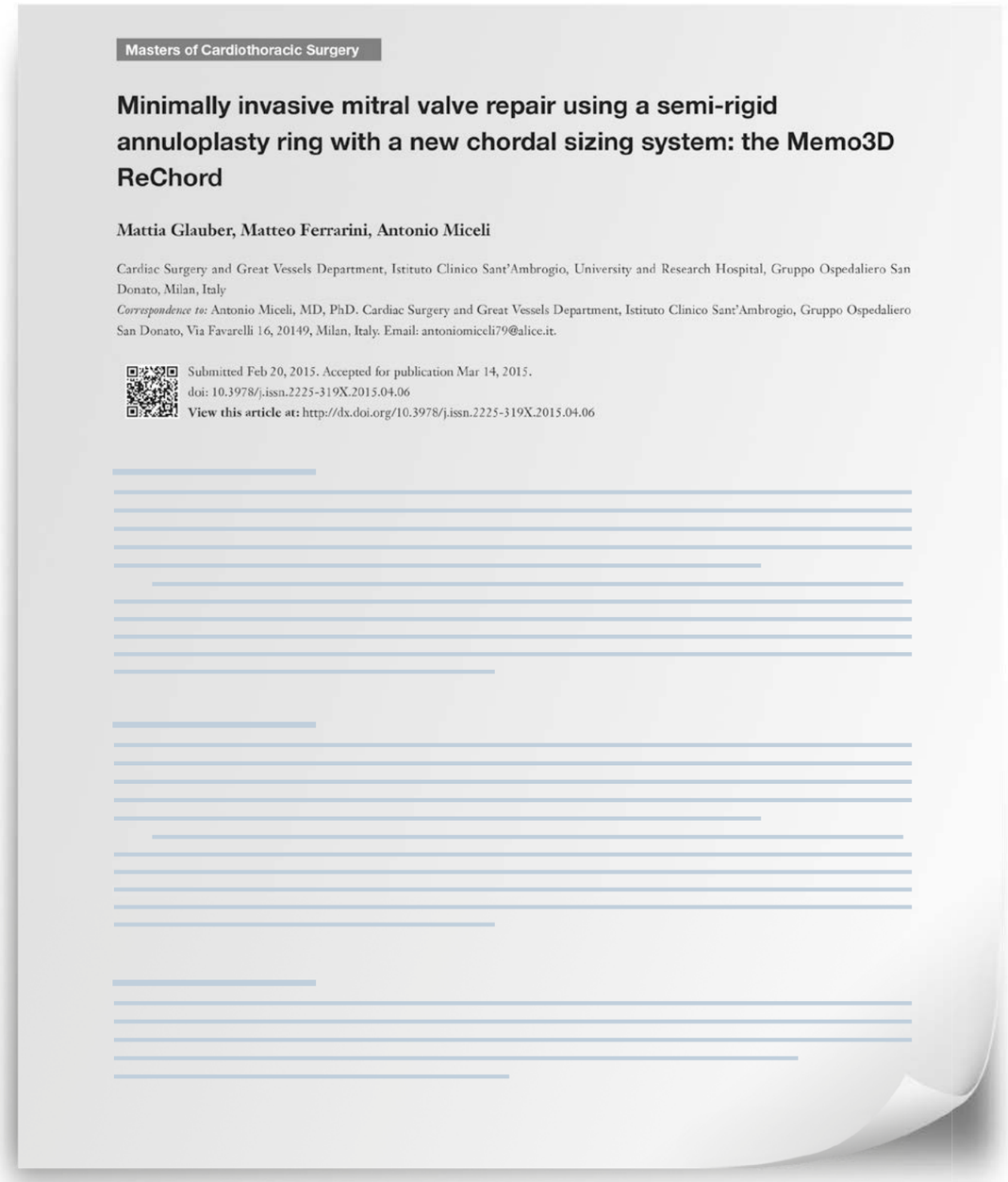
3

"In this observational study, we demonstrated that in patients with a preserved mitral annular saddle configuration, defined as AHCWR ≥15%, a semirigid annuloplasty ring was a reliable choice for mitral valve repair, with satisfactory early outcomes."

"Our series represents the first Asian clinical experience with the Memo 3D ReChord ring. We found that the innovative yet straightforward feature of this new design greatly simplified the artificial chordal length measurement during mitral valve repair..."

"According to our experience, the Memo 3D ReChord ring is particularly useful for repairing anterior leaflet or bileaflet lesions."

Minimally invasive mitral valve repair using a semi-rigid annuloplasty ring with a new chordal sizing system: the Memo3D ReChord



Masters of Cardiothoracic Surgery

Minimally invasive mitral valve repair using a semi-rigid annuloplasty ring with a new chordal sizing system: the Memo3D ReChord

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Glauber M.
Ann Cardiothorac Surg 2015 May;4(3):298-300

4

"...In recent years a new paradigm of "respect rather than resect" approach has become popular among surgeons and is based on a more extensive use of artificial PTFE chordae associated with limited resection techniques."

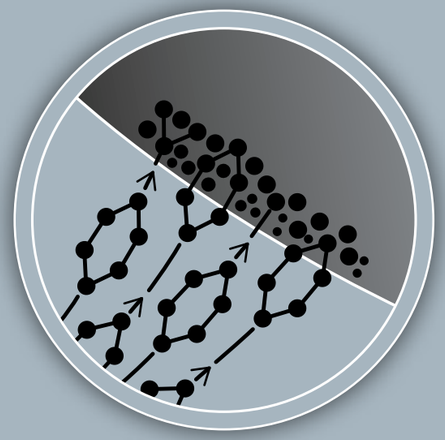
"The Memo3D ReChord is a semi-rigid complete prosthetic ring associated with a temporary chordal guide system with the aim of simplifying the implantation of PTFE neochordae without the need for measuring their length. [...] The length of the neochordae obtained will exactly match the plane of the native annulus at the coaptation point."

"This is a simple and reproducible technique, suitable for both anterior and posterior leaflet prolapse, which restores leaflet motion and ensures a large surface of coaptation."

"According to our experience, the temporary chordal guide system allows a correct implantation of PTFE neochordae without the need for chordal measurement, short operative times and doesn't require a long learning process."

"In our opinion, its use might standardize the "respect rather than resect" mitral valve repair technique, further facilitating a MIMV surgical approach."

CARBOFILM® COATING ON ANNULOPLASTY RINGS
CLINICAL EVIDENCE



1. **Sovering anuloplasty rings: Experimental pathology in the sheep model**
   Della Barbera M.
   Cardiovasc Pathol 2005 Mar-Apr;14(2):96-103

Sovering anuloplasty rings: Experimental pathology in the sheep model

ELSEVIER

Cardiovascular Pathology 14 (2005) 96–103

CARDIOVASCULAR PATHOLOGY

Original Article

Sovering annuloplasty rings: Experimental pathology in the sheep model

Mila Della Barbera[a], François Laborde[b], Gaetano Thiene[a], Valter Arata[c], Elena Pettenazzo[a], Enrico Pasquino[c], Luc Behr[b], Marialuisa Valente[a,*]

[a]*Institute of Pathological Anatomy, University of Padua Medical School, Padua, Italy*
[b]*Institute Mutualiste Montsouris, Chirurgie Cardiaque (IMM-R center), Adultes et Pediatrie, Paris, France*
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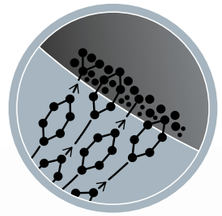
Received 29 July 2004; received in revised form 6 December 2004; accepted 15 December 2004

Abstract

Introduction: A new flexible annuloplasty ring (Sovering, Sorin Biomedica Cardio), both closed and open, has been designed and consists of radiopaque silicone core impregnated with barium sulfate and covered by a knitted polyester fabric coated with Carbofilm. The aim of the study was to test the biological compatibility of the new device in large animals in orthotopic position. **Methods:** Ten Sovering rings were implanted in 10 female adult sheep, 7 mitral (3 open, 4 closed) and 3 tricuspid (all open). The size was 23–25 mm in the mitral and 28–30 mm in the tricuspid position, and the time in place varied from 63 to 110 days (mean=89±14) and from 58 to 63 days (mean=61±3), respectively. The morphological analysis consisted of gross, histological, immunohistochemical and ultrastructural investigations. **Results:** The prosthetic ring appeared well implanted in the valve atrioventricular (AV) junction, encapsulated by a thin fibrous sheath without any evidence of thrombus deposition, fibrinous lining or exuberant fibrous tissue overgrowth. No adverse inflammatory reaction was observed, but rare lymphocytes, macrophages and foreign body giant cells. At electron microscopy, the fibrous tissue appeared to permeate deeply within the fabric network; reendothelization on the surface was noted and confirmed by immunohistochemistry. Sirius red staining at polarized light revealed a higher content of collagen type III in the mitral than in the tricuspid position. **Conclusions:** Sovering annuloplasty rings implanted in the AV valves of adult sheep showed excellent biocompatibility, fibrous encapsulation and reendothelization. The absence of thrombosis and exuberant fibrous tissue reaction supports the effective use of Carbofilm covering in annuloplasty devices. © 2005 Elsevier Inc. All rights reserved.

Keywords: Annuloplasty; Experimental cardiac surgery; Sheep; Sovering

Della Barbera M.
Cardiovasc Pathol 2005 Mar-Apr;14(2):96-103



1

“Biocompatibility and haemocompatibility are the main requisites of endovascular artificial devices. Thrombotic and thromboembolic complications of endovascular prosthesis represent a major clinical problem.”

“Carbofilm, which is a turbostatic carbon coating deposited in a very thin layer, was applied to the new Sovering annuloplastic rings. The aim was to reduce thrombotic and thromboembolic complications and minimize fibrous overgrowth”

“The results of our animal investigation suggest excellent biocompatibility without adverse inflammatory reaction”

“Thrombosis was not noticed, either at the gross or at the microscopic levels. Fibrous tissue reaction was mild and just enough to encapsulate the prosthetic ring”

“An endothelial lining covering the fibrous capsule was clearly shown both at immunohistochemistry and transmission electron microscopy”

“The absence of platelet/thrombus deposition and of exuberant fibrous tissue growth can be explained by the efficacy of Carbofilm coating, thus supporting its use also in annuloplasty rings.”

Notes:

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