Rationale, design and key findings from the International Registry of Acute Aortic Dissection (IRAD)

Santi Trimarchi, MD, PhD

Associate Professor of Vascular Surgery, University of Milan
Head, Unit of Vascular Surgery II
Director, Thoracic Aortic Research Center
IRCCS Policlinico San Donato
IRAD Disclosures

- W.L. Gore & Associates, Inc.
- Active Sites
- Medtronic
- Varbedian Aortic Research Fund
- The Hewlett Foundation
- The Mardigian Foundation
- UM Faculty Group Practice
- Terumo
- Ann and Bob Aikens
• IRAD Rationale and Design

• IRAD Key Findings

• IRAD News and Upcoming
- IRAD Rationale and Design
- IRAD Key Findings
- IRAD News and Upcoming
IRAD (International Registry of Acute Aortic Dissection): 1996

Co-Principal Investigators:

Kim A. Eagle, MD, University of Michigan, Ann Arbor, Michigan USA;
Eric M. Isselbacher, MD, Mass. General Hospital, Boston, Massachusetts, USA;
Christoph A. Nienaber, MD, University of Rostock, Rostock, Germany.
Active IRAD Sites [54]

- St. Michael’s Hospital
- Toronto General Hospital
- Minneapolis Heart Institute
- University of Calgary
- University of Minnesota
- Mayo Clinic
- University of Wisconsin
- University of Chicago
- Advocate Health
- University of Michigan
- University of Washington
- Henry Ford Health System
- University of Colorado
- Washington University
- Cedars-Sinai Medical Center
- University of Pittsburgh
- St. Thomas Health
- Vanderbilt University
- Mission Health
- Emory University
- Houston Methodist
- Baylor College of Medicine
- University of Texas Health
- University of Pennsylvania
- University of Virginia
- Duke University
- Dartmouth-Hitchcock
- University of Florida
- University of Maryland
- Massachusetts General Hospital
- University of Massachusetts
- Brigham & Women’s Hospital
- North Shore – LIJ Health System
- Newark Beth Israel Medical Center
- Beth Israel Deaconess Medical Center
- Tromsø University Hospital
- University of Rostock
- Radboud University
- Hôpital Bichat
- Robert-Bosch Krankenhaus
- University of Vienna
- The Technische Universität München
- Medical University of Graz
- IRCCS Policlinico San Donato
- Policlinico di Monza
- University of Tokyo
- University Hospital S. Orsola
- Monaldi Hospital
- University of Salerno
- Medanta the Medicity
- Hadassah University Hospital
- Hospital General Universitari Vall d’Hebron
- Hospital Universitario “12 de Octubre”
- Royal Prince Alfred Hospital
Active IRAD Sites [54]

St. Michael's Hospital
Toronto General Hospital
Minneapolis Heart Institute
University of Calgary
University of Minnesota
Mayo Clinic
University of Wisconsin
University of Chicago
Advocate Health
University of Michigan
University of Washington
Henry Ford Health System
University of Colorado
Washington University
Cedars-Sinai Medical Center
University of Pittsburgh
St. Thomas Health
Vanderbilt University
Mission Health
Emory University
Houston Methodist
Baylor College of Medicine
University of Texas Health
University of Pennsylvania
University of Virginia
Duke University
Dartmouth-Hitchcock
University of Florida
University of Maryland
Massachusetts General Hospital
University of Massachusetts
Brigham & Women's Hospital
North Shore - LIJ Health System
Newark Beth Israel Medical Center
Beth Israel Deaconess Medical Center

Tromsø University Hospital
University of Rostock
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Hospital Universitario “12 de Octubre”
Royal Prince Alfred Hospital
<table>
<thead>
<tr>
<th>Variables</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>290 variables</td>
<td></td>
</tr>
</tbody>
</table>
IRAD – Total Patients

Type A: 5288
Type B: 2753

Total Patients: 8041
Active IRAD IVC Sites [31]

St. Michael's Hospital
Toronto General Hospital
University of Calgary
University of Minnesota
Mayo Clinic
University of Chicago
Advocate Health
University of Michigan
Washington University
Cedars-Sinai Medical Center
Vanderbilt University
University of Pittsburgh
Emory University
Duke University
University of Pennsylvania
University of Maryland
Massachusetts General Hospital

LIJ Health System University
St. Michael's University
Baylor
Beth Israel Deaconess

Tromsø University Hospital
University of Rostock
Robert-Bosch Krankenhaus
University of Vienna
The Technische Universitat Munchen
IRCCS Polyclinico San Donato
University Hospital S. Orsola
University of Salerno
Medanta the Medicity
Hadassah University Hospital
Royal Prince Alfred Hospital
Co-Principal Investigators:
Himanshu Patel, MD, University of Michigan, Ann Arbor, Michigan USA;
Santi Trimarchi, MD; University of Milan, Italy.

225 variables
Cases Enrolled to Date

2808 cases enrolled
IRAD InterVentional Cohort - IVC

- 2322 Type A cases
  - 2229 surgical
  - 41 endovascular
  - 52 hybrid

- 486 Type B cases
  - 113 surgical
  - 341 endovascular
  - 32 hybrid
• 74 papers
• 1 book

NEJM 1
JAMA 1
Circulation 24
JACC 5
EHJ 1
Am J Cardiology 8
Am J Medicine 2
Am Heart J 2
Surgery 1
JTCVS 6
Ann Thorac Surg 5
J Vasc Surg 5
EJVES 2
Ann Vasc Surg 1
Vasc Med 1
Chronobiology Intl. 1
Mayo Clin Proc 2
• IRAD Rationale and Design

• IRAD Key Findings

• IRAD News and Upcoming
The IRAD Classification System for Characterizing Survival after Aortic Dissection

Anna M. Booher, MD, Eric M. Isselbacher, MD, Christoph A. Nienaber, MD, Santi Trimarchi, MD, Arturo Evangelista, MD, Daniel G. Montgomery, BS, James B. Froehlich, MD, MPH, Marek P. Ehrlich, MD, Jae K. Oh, MD, James L. Januzzi, MD, Patrick O’Gara, MD, Thoralf M. Sundt, MD, Kevin M. Harris, MD, Eduardo Bossone, MD, PhD, Reed E. Pyeritz, MD, PhD, Kim A. Eagle, MD; IRAD Investigators

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D-Dimer in Aortic Dissection

Patient presenting with chest pain

Rapid diagnostic test
- Blood test (incl. D-dimer)
- Chest X-ray, Electrocardiogram
- Echocardiogram

D-dimer < 500ng/ml
- Rule-out aortic dissection if within 24 hrs of onset and if no other signs of disease are seen on other tests

D-dimer > 1500ng/ml
- Rule-in aortic dissection if within 6 hrs of onset and continue to further diagnostic test such as imaging procedure
Importance of the Diameter

Aortic Diameter ≥5.5 cm Is Not a Good Predictor of Type A Aortic Dissection
Observations From the International Registry of Acute Aortic Dissection (IRAD)

Linda A. Pape, MD; Thomas T. Tsai, MD; Eric M. Jesselbacher, MD; Jae K. Oh, MD; Patrick T. O’Gara, MD; Arturo Evangelista, MD; Rossella Fattori, MD; Gabriel Meinhardt, MD; Santi Trimarchi, MD; Eduardo Bossone, MD; Toru Suzuki, MD; Jeanna V. Cooper, MS; James B. Froehlich, MD, MPH; Christoph A. Nienaber, MD; Kim A. Eagle, MD; on behalf of the International Registry of Acute Aortic Dissection (IRAD) Investigators

(Circulation. 2007;116:1120-1127.)
Importance of the Diameter

**Type B Aortic Dissection**

- **Mean = 4.41**
- **Std Dev = 1.36**
- **N = 613**

**Descending aortic diameter of 5.5 cm or greater is not an accurate predictor of acute type B aortic dissection**

Trimarchi et al. (J Thorac Cardiovasc Surg 2011;142:e101-7)
The conceptual model explaining the increased mortality in this patient subset.
2652 Type A and B

IMH 178 cases (6.3%).
- Type A IMH 64 (3.5%)
- Type B IMH 90 (12.1%)
- Arch IMH 24 (8.5%)

Pts with IMH tended to be older (68.7 versus 61.7 years; p<0.001) and more likely to have distal aortic involvement (60.3% versus 35.3%; p<0.0001).
### Insight IMH Type A

<table>
<thead>
<tr>
<th>Category</th>
<th>IMH n=64</th>
<th>Classic AoD n=1744</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-hospital mortality</td>
<td>17 (26.6%)</td>
<td>463 (26.5%)</td>
<td>0.998</td>
</tr>
<tr>
<td>Medical management</td>
<td>4 (40.0%)</td>
<td>128 (61.8%)</td>
<td>0.195</td>
</tr>
<tr>
<td>Surgical management</td>
<td>13 (24.1%)</td>
<td>311 (20.9%)</td>
<td>0.574</td>
</tr>
</tbody>
</table>
The differences and similarities between intramural hematoma of the descending aorta and acute type B dissection

Jip L. Toeknaar, MD, Kevin M. Harris, MD, Gilbert R. Upchurch Jr, MD, Arturo Evangelista, MD, PhD, Frans L. Moll, MD, PhD, Marco di Eusanio, MD, PhD, Ken Eagle, MD, and Santi Trimarchi, MD, PhD, on behalf of IRAD investigators, Milan, Italy; Minneapolis, Minn; Charlottesville, Va; Barcelona, Spain; Utrecht, The Netherlands; Bologna, Italy; and Ann Arbor, Mich
Insight IMH Type B

ABAD:
- Medical*: 62%
- Surgical*: 23%
- Endovascular*: 14%
- Hybrid: 1%

IMHB:
- Medical*: 87%
- Surgical*: 5%
- Endovascular*: 7%
- Hybrid: 1%
## Insight IMH Type B

<table>
<thead>
<tr>
<th>Category</th>
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<th></th>
<th>p-value</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>True IMH</td>
<td>Classic AoD</td>
<td></td>
</tr>
<tr>
<td>In-hospital mortality</td>
<td>7 (6.5%)</td>
<td>84 (10.6%)</td>
<td>0.188</td>
<td></td>
</tr>
<tr>
<td>Medical management</td>
<td>6 (6.4%)</td>
<td>44 (9.0%)</td>
<td>0.413</td>
<td></td>
</tr>
<tr>
<td>Endovascular</td>
<td>0 (0.0%)</td>
<td>17 (11.9%)</td>
<td>0.313</td>
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<tr>
<td>1-year follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow-up available (% of total)</td>
<td>45 (42%)</td>
<td>274 (34.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Descending Aortic enlargement diameter</td>
<td>10 (38.5%)</td>
<td>90 (60.8%)</td>
<td>0.034</td>
<td></td>
</tr>
<tr>
<td>Mortality</td>
<td>4 (8.9%)</td>
<td>19 (6.9%)</td>
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Importance of Age in Acute Type A Aortic Dissection

Role of age in acute type A aortic dissection outcome: Report from the International Registry of Acute Aortic Dissection (IRAD)

Santi Trimarchi, MD,⁎ Kim A. Eagle, MD,⁎ Christoph A. Nienaber, MD,⁎ Vincenzo Rampoldi, MD,⁎ Frederik H. W. Jonker, MD,⁎ Carlo De Vincentiis, MD,⁎ Alessandro Frigola, MD,⁎ Lorenzo Menicanti, MD,⁎ Thomas Tsai, MD,⁎ Jim Froelich, MD,⁎ Arturo Evangelista, MD,⁎ Daniel Montgomery, MD,⁎ Eduardo Bosson, MD,⁎ Jeanna V. Cooper, MS,⁎ Jin Li, MS,⁎ Michael G. Deeb, MD,⁎ Gabriel Meinhardt, MD,⁎ Thoralf M. Sembdt, MD,⁎ and Eric M. Isselbacher, MD,⁎ on behalf of the International Registry of Acute Aortic Dissection (IRAD) Investigators

(J Thorac Cardiovasc Surg 2010;140:784-9)
Importance of Age in Acute Type A Aortic Dissection
Importance of Age in Acute Type A Aortic Dissection
TEVAR for Acute Type B

Survival After Endovascular Therapy in Patients With Type B Aortic Dissection

A Report From the International Registry of Acute Aortic Dissection (IRAD)

Rossella Fattori, MD,* Daniel Montgomery, BS,† Luigi Lovato, MD,‡ Stephan Kische, MD,§ Marco Di Eusanio, MD,¶ Huseyin Ince, MD,¶ Kim A. Eagle, MD,¶ Eric M. Isselbacher, MD,¶ Christoph A. Nienaber, MD§
Importance of Recurrent / Refractory Pain and Hypertension

In-hospital mortality in low-risk and intermediate risk groups

![Bar chart showing in-hospital mortality percentages]

Percent

- Uncomplicated ABAD: 4.0%
- Intermediate risk: 17.4%

Importance of Refractory and Hypertension in Acute Type B Aortic Dissection: Insights From the International Registry of Acute Aortic Dissection (IRAD)


and on behalf of the International Registry of Acute Aortic Dissection (IRAD) Investigators

Circulation 2010;122:1283-1289; originally published online Sep 13, 2010;
Importance of Recurrent / Refractory Pain and Hypertension

In-hospital mortality after medical management

- Uncomplicated ABAD
- Intermediate risk

Circulation: Journal of the American Heart Association

Importance of Refractory Pain and Hypertension in Acute Type B Aortic Dissection: Insights From the International Registry of Acute Aortic Dissection (IRAD)


Circulation 2010;122;1283-1289; originally published online Sep 13, 2010;
Management

Acute type B aortic dissection complicated by visceral ischemia

Frederik H. W. Jonker, MD, PhD, a,b Himanshu J. Patel, MD, c Gilbert R. Upchurch, MD, d David M. Williams, MD, e Daniel G. Montgomery, BS, f Thomas G. Gleason, MD, MS, g Alan C. Braverman, MD, h Udo Sechtem, MD, i Rossella Fattori, MD, j Marco Di Eusanio, MD, PhD, k Arturo Evangelista, MD, l Christoph A. Nienaber, MD, m Eric M. Isselbacher, MD, n Kim A. Eagle, MD, o and Santi Trimarchi, MD, PhD p

(J Thorac Cardiovasc Surg 2015;149:1081-6)
• IRAD Rationale and Design

• IRAD Key Findings

• IRAD News and Upcoming
Quality of Life post-AD: Activity Recommendations

<table>
<thead>
<tr>
<th>Activity</th>
<th>Metabolic Equivalents</th>
</tr>
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<tbody>
<tr>
<td>Lying quietly</td>
<td>1.0</td>
</tr>
<tr>
<td>Riding in a vehicle</td>
<td>1.0</td>
</tr>
<tr>
<td>Sitting and doing light activity</td>
<td>1.5</td>
</tr>
<tr>
<td>Playing the accordion</td>
<td>1.8</td>
</tr>
<tr>
<td>Walking slowly, &lt;2 miles per hour (mph)</td>
<td>2.0</td>
</tr>
<tr>
<td>Gardening, light</td>
<td>2.0</td>
</tr>
<tr>
<td>Playing the flute</td>
<td>2.0</td>
</tr>
<tr>
<td>Playing the piano</td>
<td>2.3</td>
</tr>
<tr>
<td>Playing the cello</td>
<td>2.3</td>
</tr>
<tr>
<td>Horseback riding (horse is walking, not running)</td>
<td>2.3</td>
</tr>
<tr>
<td>Billiards</td>
<td>2.4</td>
</tr>
<tr>
<td>Canoeing at a slow, leisurely pace</td>
<td>2.5</td>
</tr>
<tr>
<td>Playing the violin</td>
<td>2.5</td>
</tr>
<tr>
<td>Watering plants</td>
<td>2.5</td>
</tr>
<tr>
<td>Aerobic/ballroom dancing at a slow, leisurely pace</td>
<td>2.9</td>
</tr>
<tr>
<td>Taking out the trash (not too heavy)</td>
<td>3.0</td>
</tr>
<tr>
<td>General house cleaning</td>
<td>3.0</td>
</tr>
<tr>
<td>Loading/unloading car</td>
<td>3.0</td>
</tr>
<tr>
<td>Walking the dog</td>
<td>3.0</td>
</tr>
<tr>
<td>Walking briskly, 3 mph</td>
<td>3.3</td>
</tr>
<tr>
<td>Heavy yard work or gardening</td>
<td>4.0</td>
</tr>
<tr>
<td>Climbing stairs</td>
<td>4.0</td>
</tr>
<tr>
<td>Bicycling, casual, &lt;10 mph</td>
<td>4.0</td>
</tr>
<tr>
<td>Raking lawn</td>
<td>4.0</td>
</tr>
<tr>
<td>Golf (without cart, carrying heavy bag of clubs)</td>
<td>4.4</td>
</tr>
<tr>
<td>Swimming at a slow pace</td>
<td>4.5</td>
</tr>
<tr>
<td>Dancing (ballet or modem)</td>
<td>4.8</td>
</tr>
<tr>
<td>Chopping wood</td>
<td>4.9</td>
</tr>
<tr>
<td>Snorkeling</td>
<td>5.0</td>
</tr>
<tr>
<td>Tennis (doubles)</td>
<td>5.0</td>
</tr>
<tr>
<td>Competitive ballroom dancing, fast</td>
<td>5.5</td>
</tr>
<tr>
<td>Square dancing</td>
<td>5.5</td>
</tr>
<tr>
<td>Ice skating</td>
<td>5.5</td>
</tr>
<tr>
<td>Mowing the lawn with hand mower</td>
<td>5.5–6.0</td>
</tr>
<tr>
<td>Shoveling snow</td>
<td>6.0</td>
</tr>
<tr>
<td>Competitive aerobic dancing</td>
<td>5.0</td>
</tr>
<tr>
<td>Ballet</td>
<td>6.0</td>
</tr>
<tr>
<td>Surfing</td>
<td>6.0</td>
</tr>
<tr>
<td>Roller skating</td>
<td>6.5</td>
</tr>
<tr>
<td>Skiing, downhill</td>
<td>6.8</td>
</tr>
<tr>
<td>Climbing hills (not carrying a load)</td>
<td>6.9</td>
</tr>
<tr>
<td>Strenuous hiking</td>
<td>6.0–7.0</td>
</tr>
<tr>
<td>Rowing/kayaking</td>
<td>6.0–8.0</td>
</tr>
<tr>
<td>Bicycling 10–16 mph</td>
<td>6.0–10.0</td>
</tr>
<tr>
<td>Climbing hills (carrying a 5-kg load)</td>
<td>7.4</td>
</tr>
<tr>
<td>Swimming, moderate or fast pace</td>
<td>7.0–8.0</td>
</tr>
<tr>
<td>Tennis (singles)</td>
<td>7.0–12.0</td>
</tr>
<tr>
<td>Jogging (10 min mile pace)</td>
<td>10.2</td>
</tr>
<tr>
<td>Skipping rope</td>
<td>12.0</td>
</tr>
<tr>
<td>Squash</td>
<td>12.1</td>
</tr>
<tr>
<td>Running, 8 mph</td>
<td>13.5</td>
</tr>
</tbody>
</table>

**Activity Recommendations for Postaortic Dissection Patients**

Ashish Chaddha, BS; Eva Kline-Rogers, MS, RN, NP; Elise M. Woznicki, BS; Robert Brook, MD; Susan Houssholder-Hughes, MSN, RN, ANP-BC; Alan C. Braverman, MD; Linda Pittler, RN, MS, CCRC; Alan T. Hirsch, MD; Kim A. Eagle, MD

*Circulation. 2014;130:e140-e142.*
Quality of Life post-AD: Activity Recommendations

• the goal is a reduction in resting BP and improved cardiovascular health, while possibly minimizing the risk of aortic dissection.

• **Aerobic exercise** at mild to moderate exertion (3–5 METs), for at least 30 minutes on most days of the week, for a total of 150 minutes/week.

• If **weightlifting** is performed, use small amounts of weight and stopping several repetitions before failure, which will avoid straining.

• Common sense approach to **sexual activity** by avoiding straining, intense physical activity, or performance leading to shortness of breath.

Activity Recommendations for Postaortic Dissection Patients

Ashish Chaddha, BS; Eva Kline-Rogers, MS, RN, NP; Elise M. Woznicki, BS; Robert Brook, MD; Susan Housholder-Hughes, MSN, RN, ANP-BC; Alan C. Braverman, MD; Linda Pitter, RN, MS, CCRC; Alan T. Hirsch, MD; Kim A. Eagle, MD

*(Circulation. 2014;130:e140-e142.)*
• From patients enrolled in IRAD-IVC, only TAAD surgically repaired were included.

• Patients were split into three equal groups based on time of intervention (T1: 1996-2003; T2: 2004-2009; T3: 2010-2016).

(AORTIC SYMPOSIUM: AORTIC DISSECTION)

Changes in operative strategy for patients enrolled in the International Registry of Acute Aortic Dissection interventional cohort program

Neil Parikh, BS, Santi Trimarchi, MD, PhD, Thomas G. Gleason, MD, Arnoud V. Kamman, MD, Marco di Eusanio, MD, PhD, Truls Myrmel, MD, PhD, Amit Korach, MD, Hersh Maniar, MD, Takeyoshi Ota, MD, PhD, Ali Khoynezhad, MD, PhD, Daniel G. Montgomery, BS, Nimesh D. Desai, MD, PhD, Kim A. Eagle, MD, Christoph A. Nienaber, MD, PhD, Eric M. Isselbacher, MD, Joseph Bavaria, MD, Thoralf M. Sundt, MD, and Himanshu J. Patel, MD

(J Thorac Cardiovasc Surg 2017;153:S74-9)
Results

In-hospital mortality

TABLE 1. Demographic characteristics and outcomes

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
<th>Trend</th>
<th>P value</th>
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<tbody>
<tr>
<td>N</td>
<td>1732</td>
<td>229 (13.2)</td>
<td>692 (40.0)</td>
<td>811 (46.8)</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Mean age, y</td>
<td>60.4 (14.0)</td>
<td>57.9 (13.9)</td>
<td>61.2 (13.8)</td>
<td>60.4 (14.1)</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Male gender</td>
<td>1152 (66.5)</td>
<td>162 (70.7)</td>
<td>451 (65.2)</td>
<td>539 (66.5)</td>
<td>.461</td>
<td></td>
</tr>
<tr>
<td>In-hospital death</td>
<td>248 (14.3)</td>
<td>40 (17.5)</td>
<td>109 (15.8)</td>
<td>99 (12.2)</td>
<td>.017</td>
<td></td>
</tr>
</tbody>
</table>

In-Hospital Death

Linear Trend p=0.013
Results

Cerebral perfusion management

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
<th>p-value</th>
<th>Trend p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebral perfusion</td>
<td>1256 (84.2)</td>
<td>141 (67.1)</td>
<td>528 (89.5)</td>
<td>587 (84.8)</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Antegrade</td>
<td>461 (61.9)</td>
<td>76 (55.9)</td>
<td>303 (58.8)</td>
<td>369 (66.1)</td>
<td>.015</td>
<td>.005</td>
</tr>
<tr>
<td>Retrograde</td>
<td>461 (38.9)</td>
<td>60 (44.1)</td>
<td>212 (41.2)</td>
<td>189 (33.9)</td>
<td>.015</td>
<td>.005</td>
</tr>
</tbody>
</table>

![Cerebral Perfusion Type](chart.png)
Results

Arterial Cannulation management

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
<th>p-value</th>
<th>Trend p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>R Axillary artery</td>
<td>527 (40.4)</td>
<td>39 (18.0)</td>
<td>175 (33.2)</td>
<td>313 (55.7)</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>cannulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Femoral cannulation</td>
<td>615 (47.1)</td>
<td>165 (76.0)</td>
<td>281 (53.3)</td>
<td>169 (30.1)</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Cannulation Cooling Site

- **Rt Axillary Artery**
  - Linear Trend p<0.001
- **Femoral Artery**
  - Linear Trend p<0.001
IRAD IVC – Trends

Results

Aortic Root management

<table>
<thead>
<tr>
<th>TABLE 2. Aortic valve and root management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Noncoronary sinus replacement</td>
</tr>
<tr>
<td>Valve sparing</td>
</tr>
</tbody>
</table>

Aortic Valve Sparing

- Linear Trend p<0.001

Frequency (%)

- 1996-2003
- 2004-2009
- 2010-2016
Results

Aortic Arch management

### TABLE 3. Aortic arch management

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
<th>Trend P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemiarch replacement</td>
<td>801 (52.9)</td>
<td>55 (27.0)</td>
<td>372 (63.3)</td>
<td>374 (51.7)</td>
<td>.001</td>
</tr>
<tr>
<td>Partial arch replacement</td>
<td>162 (11.6)</td>
<td>44 (20.7)</td>
<td>62 (12.0)</td>
<td>56 (8.4)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Complete arch replacement</td>
<td>306 (21.0)</td>
<td>34 (16.4)</td>
<td>113 (21.5)</td>
<td>159 (22.1)</td>
<td>.131</td>
</tr>
<tr>
<td>Single arterial button</td>
<td>75 (5.7)</td>
<td>3 (1.5)</td>
<td>26 (5.5)</td>
<td>46 (7.3)</td>
<td>.003</td>
</tr>
<tr>
<td>Branched graft</td>
<td>145 (10.8)</td>
<td>22 (10.7)</td>
<td>57 (11.8)</td>
<td>66 (10.1)</td>
<td>.600</td>
</tr>
<tr>
<td>Elephant trunk</td>
<td>62 (4.6)</td>
<td>2 (1.0)</td>
<td>20 (4.1)</td>
<td>40 (6.1)</td>
<td>.002</td>
</tr>
<tr>
<td>Frozen elephant trunk</td>
<td>31 (1.8)</td>
<td>–</td>
<td>21 (3.0)</td>
<td>10 (1.2)</td>
<td>.914</td>
</tr>
</tbody>
</table>

---

**Elephant Trunk**

Linear Trend p=0.002
Retrograde Extension of Type B Dissection in Arch

Incidence 16.5%

Impact of Retrograde Arch Extension in Acute Type B Aortic Dissection on Management and Outcomes

Foeke J. H. Vauta, MD, Jip L. Tolenaar, MD, PhD, Himanshu J. Patel, MD, Jehangir J. Appoo, MD, Thomas T. Tsai, MD, Nitesh D. Desai, MD, PhD, Daniel G. Montgomery, BS, Firas F. Musa, MD, Gilbert R. Upchurch, MD, Rosella Fattori, MD, G. Chad Hughes, MD, Christoph A. Nienaber, MD, PhD, Eric M. Isselbacher, MD, Kim A. Eagle, MD, and Santi Trimarchi, MD, PhD, on behalf of all International Registry of Acute Aortic Dissection (IRAD) Investigators

Retrograde Extension of Type B Dissection in Ascending Aorta

Early Outcomes of Acute Retrograde Dissection From the International Registry of Acute Aortic Dissection

Foeke J.H. Nauta, MD, PhD, 1, 2 Joon Bum Kim, MD, PhD, 3, 4 Himanshu J. Patel, MD, 5 Mark D. Peterson, MD, PhD, 6 Hans-Henning Eckstein, MD, PhD, 7 Ali Khoynezhad, MD, PhD, 8 Marek P. Ehrlich, MD, 9 Marco Di Eusanio, MD, PhD, 10 Alessandro Della Corte, MD, PhD, 11 Daniel G. Montgomery, BS, 12 Christoph A. Niemaber, MD, PhD, 13 Eric M. Isselbacher, MD, 14 Kim A. Eagle, MD, 15 Thoralf M. Sundt, MD, 16 and Santi Trimarchi, MD, PhD

• Descending aortic dimensions were greater in patients with recurrent AD than in patients with initial AD
  • type A: 4.3 cm versus 3.3 cm, P<0.001
  • type B: 5.0 cm versus 4.0 cm, P<0.001
  • this observation was accentuated among patients with Marfan syndrome.

Recurrent Aortic Dissection

Observations From the International Registry of Aortic Dissection


Shock in Type A Dissection

In-hospital mortality in TAAAD patients presenting with and without shock.

Shock complicating type A acute aortic dissection: Clinical correlates, management, and outcomes

Eduardo Bonow, MD, PhD, 7 Reed E. Pyeritz, MD, PhD, 8 Alan C. Braverman, MD, 7 Mark D. Peressin, MD, PhD, 8 Marek Ehrlich, MD, 7 Patrick O’Gara, MD, 7 Yori Suzuki, MD, PhD, 7 Santi Trimarchi, MD, PhD, 7 Dan Gilson, MD, 1 Kevin Gerszten, MD, 7 Nimesh D. Desai, MD, 1 Daniel G. Montgomery, BS, 1 Eric M. Isselbacher, MD, 6 Christoph G. Nienaber, MD, 7, and Kim A. Eagle, MD, 7, on behalf of IRAD Investigators. Solerova, Italy; Philadelphia, PA; St. Louis, MO; Ontario, Canada; Vienna, Austria; Boston, MA; Tokyo, Japan; San Donato, Italy; Jerusalem, Israel; Rochester, MN; Ann Arbor, MI; and Buxtehude, Germany.

[Am Heart J 2016;176:93-9]
Shock in Type A Dissection

- TAAAD survivors with or without shock showed similar long-term mortality.

**Table VII.** Outcomes in TAAAD patients with and without shock

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall</th>
<th>Shock</th>
<th>No shock</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-y survival estimate (Kaplan-Meier analysis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>89.0%</td>
<td>82.0%</td>
<td></td>
<td>.609</td>
</tr>
<tr>
<td>Surgery</td>
<td>90.4%</td>
<td>85.1%</td>
<td></td>
<td>.635</td>
</tr>
<tr>
<td>Medical therapy only</td>
<td>50.0%</td>
<td>38.2%</td>
<td></td>
<td>.221</td>
</tr>
</tbody>
</table>
New Information from the IRAD Registry

IRAD General. Uncomplicated Acute Type B: BMT vs TEVAR

Jan 1996 - July 2017: 2153 overall

<table>
<thead>
<tr>
<th>Type B Uncomplicated</th>
<th>BMT</th>
<th>TEVAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall 1070</td>
<td>973 (90.9%)</td>
<td>97 (9.1%)</td>
</tr>
</tbody>
</table>

Uncomplicated TBAD was defined as the absence of the following:

- aortic rupture, shock/hypotension
- periaortic hematoma
- visceral ischemia, acute renal failure, ischemic lower extremity
- spinal cord ischemia
- coma
- recurrent or refractory pain, refractory hypertension
- descending aortic diameter > 5.4 cm
- extension of dissection

*Spinelli D. et al. Unpublished data*
New Information from the IRAD Registry

IRAD General. Uncomplicated Acute Type B: BMT vs TEVAR

Jan 1996 - July 2017: 2153 overall

<table>
<thead>
<tr>
<th>Type B Uncomplicated</th>
<th>BMT</th>
<th>TEVAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival 1 yr</td>
<td>94.9±1.0</td>
<td>97.1±2.8</td>
</tr>
<tr>
<td>Survival 3 yr</td>
<td>86.7±1.8</td>
<td>88.7±6.3</td>
</tr>
<tr>
<td>Survival 5 yr</td>
<td>76.7±2.7</td>
<td>79.9±1</td>
</tr>
</tbody>
</table>

Spinelli D. et al. Unpublished data
New Information from the IRAD Registry

IRAD General. Management and Outcome in pts with Arch Tear

De Beaufort H. et al. In submission
New Information from the IRAD Registry

IRAD General. Management and Outcome in pts with Arch Tear

De Beaufort H. et al. In submission
New Information from the IRAD Registry

IRAD General. Management and Outcome in pts with Arch Tear

De Beaufort H. et al. In submission
IRAD Limitations

• Retrospective nature of case identification and data abstraction is associated with ascertainment biases.

• IRAD is an observational study based on patients treated in tertiary referral centers, and therefore its findings may not necessarily be applicable to the total population.

• In-hospital death is the only outcome parameter that was assessed in this registry analysis. It should also take into consideration non-fatal adverse events, patient functional status, and resource utilization.

• We had only information on follow-up mortality and did not have information on all causes of death. Therefore, we were also unable to evaluate other endpoints, such as freedom from reoperation, rupture or re-dissection.
• IRAD provides a valuable platform for modern strategic planning and teaching

• Serves on the scientific scope as a hypothesis generating source of new information on an old disease.
IRAD Conclusions

IRAD Working Groups

- Imaging
- Interventional
- Patients and Families Education
- GenRAD

IRAD site: http://www.iradonline.org/index.html
IRAD Conclusions

2017 Submitted Papers

- Incidence and predictors of in-hospital complications in uncomplicated TBAAD (Kamman et al; Aorta)
- Insights from IRAD – collaborative clinic research: a 20-year experience (Evangelista et al; Circulation)
- Impact of aortic valve replacement during aortic dissection repair (Loor et al; JTCVS)
- Head and neck pain in patients presenting with AAD (Philip et al; Aorta)
- Association of presenting SBP with outcomes in patients with AAD: observations from IRAD (Bossone et al; JACC)
- Delay from diagnosis to surgery in transferred TAAAD patients (Froehlich et al; AJM)
- DeBakey types I and II are distinct subsets within TAAAD (Kohl et al; JAHA)
- The clinical impact of imaging surveillance and clinic visit frequency after AAD (Chaddha et al; Aorta)
- Presenting characteristics and outcomes of painless TAAAD (Kolevar et al; AHJ)

2017 Submitted Abstracts

- Predictors and outcomes associated with post-operative pericardial tamponade in TAAAD patients [Banskota]
- Anticoagulation therapy following AAD [Bismuth]
- Diagnostic imaging for AAD: imaging sensitivity and preference revisited [Mauban]
- Predicting factors for 5 year adverse events after treatment for AAD [Myrmel]
- Factors associated with the use of TEVAR after TBAAD [O’Donnell]
- Pleural effusion is a surrogate marker for complications in TBAAD: observations from IRAD [Reutersberg]
- Role of stent grafts in patients with MFS presenting with TBAAD: a comparison study [Zubair]
Acute aortic dissection impacts your health, lifestyle, and relationships. After dissection, you may have many questions about the disease itself, the limitations it presents, and how to move forward. This website was designed by cardiologists, aortic surgeons, and nurses to help guide you in managing this disease.