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2016

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ANGIOGRAFIA ROTACIONAL 3D: ¿MAYOR O MENOR RADIACION?

- CARLOS ZABAL

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¿Qué cambios ha traído la AR3D?

- Mejor definición anatómica con imágenes 3D.
- Imágenes disponibles en forma inmediata.
- Mejor planeación de la estrategia de intervención.
- Superposición de imágenes para guiar la colocación de dispositivos.
- Al tener mejor definición anatómica y espacial se reduce el tiempo de intervención.

¿La AR3D implica mayor radiación?

- Los equipos han mejorado incorporando el principio ALARA.

¿La AR3D implica mayor radiación?

GE
Dose Management Tools

Innova's smart system design integrates tableside dose management tools into procedural workflow. These tools help clinicians adapt to a wide range of imaging situations.

¿La AR3D implica mayor radiación?

Philips
Dose Management Tools

DoseWise is a holistic approach with Eleva programming . DoseWise is a set of techniques, programs and practices that ensures optimal image quality, while protecting people in X-ray environments. Although image quality is strongly related to dose, it is not the only determining parameter. There are opportunities to optimize image quality throughout the entire digital imaging detection chain. Moreover, each of these elements interacts with the others. That's why Philips views each fluoroscopy system as a whole, and considers how each link affects the rest.

¿La AR3D implica mayor radiación?

Siemens

Dose Reduction Advances in Fluoroscopy

In radiography and fluoroscopy the comprehensive CARE dose reduction program with the ability to combine several applications enables reduction in dose without compromising image quality. Further intelligent dose reduction with:

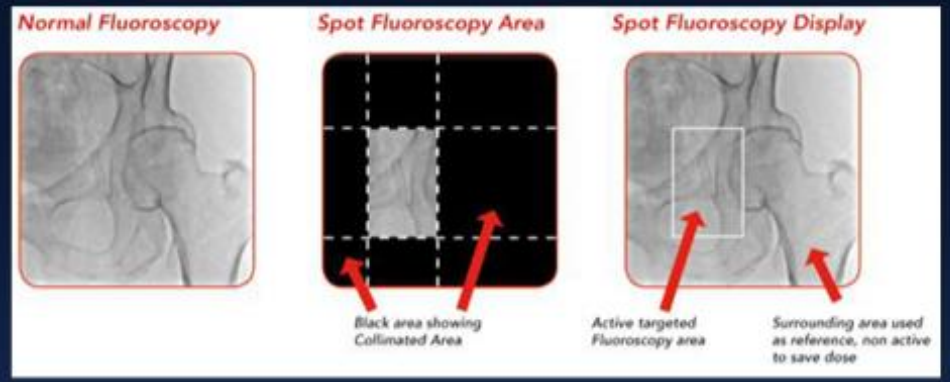
- High efficiency digital flat detectors
- Easy grid removal for pediatric and extremities examinations
- Low absorption tabletop material and grids
- Short table top to detector and wall stand front to detector distances
- Wall stand top alignment for more efficient chest exam collimation
- Organ programs with pre-set collimation size and Cu filters for skin dose reduction

¿La AR3D implica mayor radiación?

Toshiba

Dose Reduction Advances in Fluoroscopy

- Spot Fluoroscopy is a unique Toshiba feature that vastly reduces the **Area** exposed to radiation during interventional procedures using fluoroscopy
- On all Infinix i systems we include a Dose **Area** Product (DAP) meter to display & record total patient dose, this **Area** Product dose can be greatly reduced using Spot Fluoroscopy mode



Comparación de equipo anterior con actual (INC)

	Inova 2000 (GE)	Allura Clarity FD10 (Philips)	p
T. Fluoros.	15:27±08:22	31:16±39.13	0.092
Air Kerma (mGY)	706.9±546.8	268.2±235.5	0.002
DAP (cGYcm^2)	5463±4790	2112±2177	0.007

Comparación de AR3D vs. Convencional 2D

Mismo equipo Philips

	Convencional	AR3D	p
T. Fluoros.	31:16±39.13	21:33±15:15	0.305
Air Kerma (mGY)	268.2±235.5	390.9±321.4	0.142
DAP (cGYcm^2)	2112±2177	2857±2468	0.284

ANGIOGRAFIA ROTACIONAL 3D

Original Article

A Comparison of Radiation Dose Between Standard and 3D Angiography in Congenital Heart Disease

João Luiz Langer Manica, Mônica Scott Borges, Rogério Fachel de Medeiros, Leandro dos Santos Fischer, Gabriel Broetto, Raul Ivo Rossi Filho

Instituto de Cardiologia / Fundação Universitária de Cardiologia, Porto Alegre, RS - Brazil

Abstract

Background: The use of three-dimensional rotational angiography (3D-RA) to assess patients with congenital heart diseases appears to be a promising technique despite the scarce literature available.

Objectives: The objective of this study was to describe our initial experience with 3D-RA and to compare its radiation dose to that of standard two-dimensional angiography (2D-SA).

Methods: Between September 2011 and April 2012, 18 patients underwent simultaneous 3D-RA and 2D-SA during diagnostic cardiac catheterization. Radiation dose was assessed using the dose-area-product (DAP).

Results: The median patient age and weight were 12.5 years and 47.5 Kg, respectively. The median DAP of each 3D-RA acquisition was 1093 $\mu Gy.m^2$ and 190 $\mu Gy.m^2$ for each 2D-SA acquisition ($p < 0.01$). In patients weighing more than 45 Kg ($n = 7$), this difference was attenuated but still significant (1525 $\mu Gy.m^2$ vs.413$\mu Gy.m^2$, $p = 0.01$). No difference was found between one 3D-RA and three 2D-SA (1525 $\mu Gy.m^2$ vs.1238 $\mu Gy.m^2$, $p = 0.575$) in this population. This difference was significantly higher in patients weighing less than 45Kg ($n = 9$) (713$\mu Gy.m^2$ vs.81$\mu Gy.m^2$, $p = 0.008$), even when comparing one 3D-RA with three 2D-SA (242 $\mu Gy.m^2$, respectively, $p < 0.008$). 3D-RA was extremely useful for the assessment of conduits of univentricular hearts, tortuous branches of the pulmonary artery, and aorta relative to 2D-SA acquisitions.

Conclusions: The radiation dose of 3D-RA used in our institution was higher than those previously reported in the literature and this difference was more evident in children. This type of assessment is of paramount importance when starting to perform 3D-RA. (Arq Bras Cardiol. 2014; 103(2):131-137)

ANGIOGRAFIA ROTACIONAL 3D

Radiation Protocol for Three-Dimensional Rotational Angiography to Limit Procedural Radiation Exposure in the Pediatric Cardiac Catheterization Lab

Congenit Heart Dis. 2016 Apr 14. doi: 10.1111/chd.12356.

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*Pediatric Cardiology Associates, Baton Rouge, La, USA; †Department of Pediatrics, Division of Pediatric Cardiology, Memphis, Tenn, USA; ‡Department of Radiology, University of Tennessee Health Science Center, Le Bonheur Children's Hospital, Memphis, Tenn, USA; §College of Medicine, University of Tennessee Health Science Center, Memphis, Tenn, USA; ¶Department of Biostatistics, Harvard Medical School, Associate Professor of Anesthesia and Biostatistics, Boston Children's Hospital, Boston, Mass, USA; **Toshiba America Medical Systems, Toshiba Education Center, Irvine, Calif, USA

ABSTRACT

Background. Three-dimensional rotational angiography (3DRA) offers more detailed anatomic information than 2D digital acquisition (2DDA). Concerns over potentially higher contrast and radiation doses have limited its routine use.
Objective. The primary objective of this study was to compare radiation doses required to obtain 3DRA using a customized low dose radiation protocol with 2DDA. The secondary objective was to compare total procedural radiation in pediatric cardiac catheterization procedures utilizing 3DRA to those that do not.
Study Design. Phantom studies were conducted to establish customized 3DRA protocols for radiation reduction. Comparison of 3DRA and non-3DRA procedures in age-, size- and diagnosis-matched controls was performed. Radiation doses were indexed to body surface area (BSA) to account for differing body habitus as validated from the phantom study.
Results. Study ($n = 100$) and control ($n = 100$) groups were matched for age (10.2 vs. 9.98 years; $P = .239$) and BSA (1.23 vs. 1.09 m^2; $P = .103$). The dose area product (DAP) to acquire a 3DRA was similar to a 5 s, 15 frames/second 2DDA (278 vs. 241 cGy/cm^2; $P = .14$). Despite the 3DRA group consisting of more complex interventions, no difference was found in the total procedural Air Kerma and DAP indexed to BSA (244 vs. 249 mGy/m^2; $P = .79$ and 3348 vs. 3176 $cGy/cm^2/m^2$; $P = .48$, respectively). The contrast volume to acquire a 3DRA compared to a 2DDA was greater (1.59 vs. 1.01 mL/kg; $P < .001$). However, no difference was found for the entire procedure (3.8 vs. 4 mL/kg, $P = .494$). This could have resulted from the need to obtain multiple 2DDAs to achieve the detail of a single 3DRA (11 vs. 7 per study; $P < .001$).
Conclusions. When 3DRA, using the proposed protocols is employed, total procedural contrast and radiation doses are comparable with the sole use of biplane cine-angiograms. These protocols may allow for routine use of 3DRA for congenital cardiac catheterizations.

ANGIOGRAFIA ROTACIONAL 3D

Pediatr Cardiol (2016) 37:528–536
DOI 10.1007/s00246-015-1310-6

ORIGINAL ARTICLE

Three-Dimensional Rotational Angiography in the Pediatric Cath Lab: Optimizing Aortic Interventions

Anna Stenger[1] · Sven Dittrich[1] · Martin Glöckler[1]

Catheterization and Cardiovascular Interventions 80:922–930 (2012)

The Use of Three-Dimensional Rotational Angiography to Assess the Pulmonary Circulation Following Cavo-Pulmonary Connection in Patients with Single Ventricle

Darren P. Berman,* MD, Danyal M. Khan, MD, Yunin Gutierrez, CVT, and Evan M. Zahn, MD

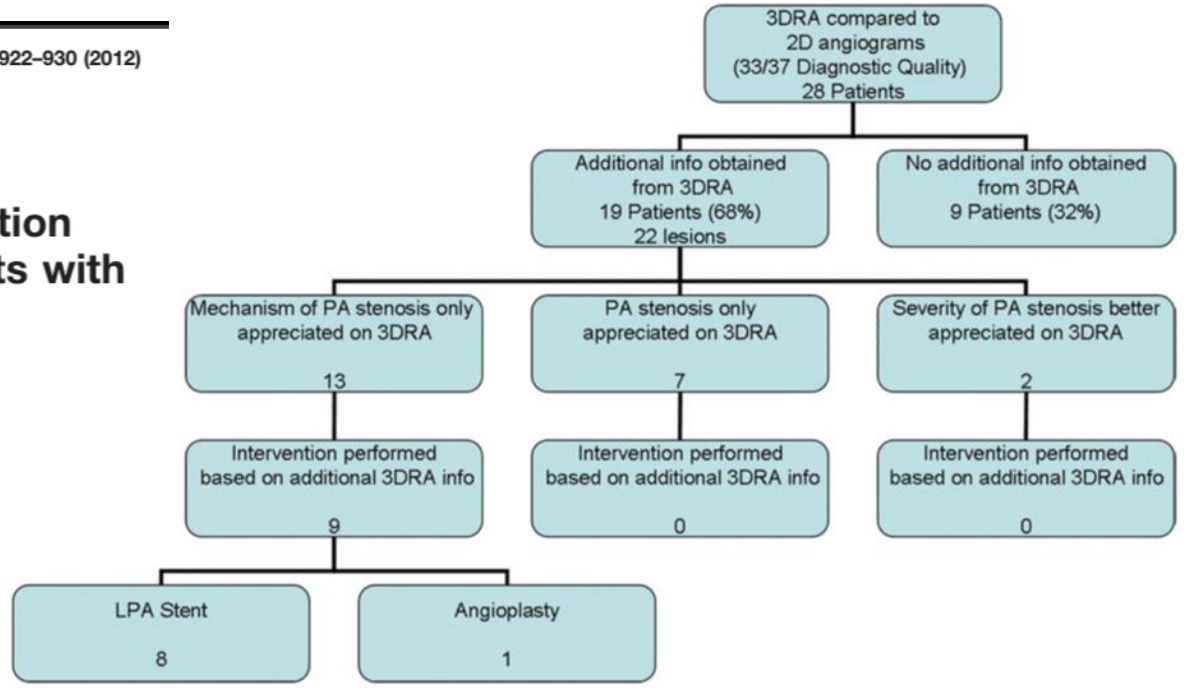
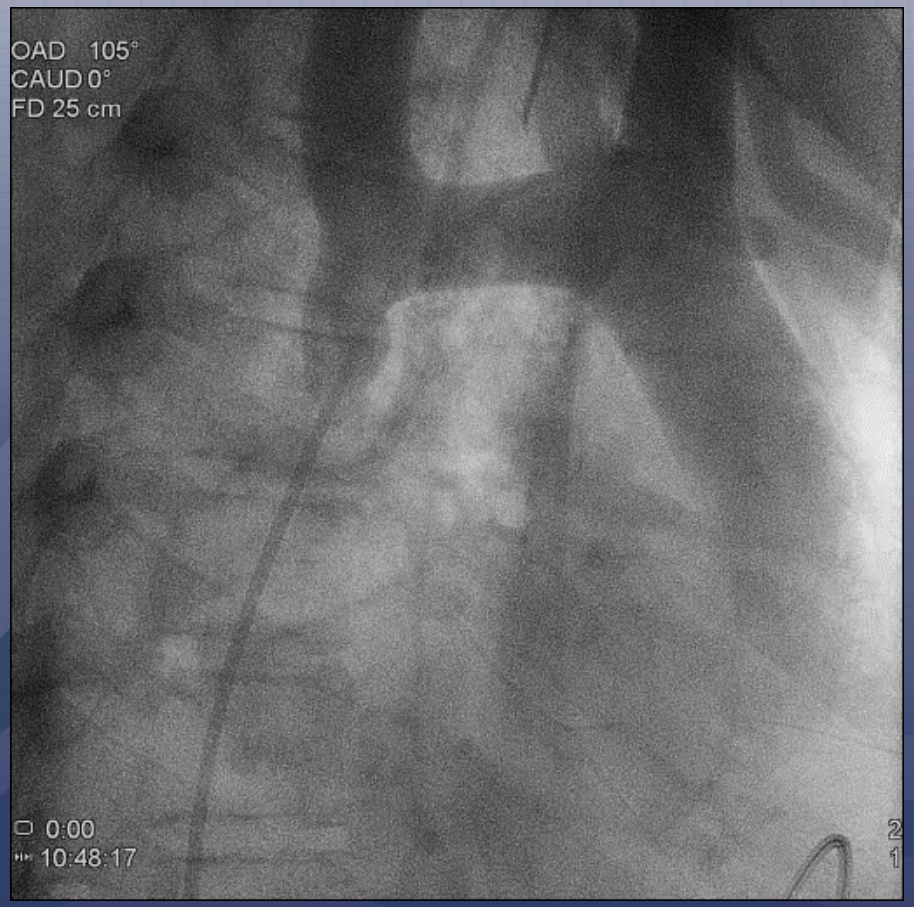
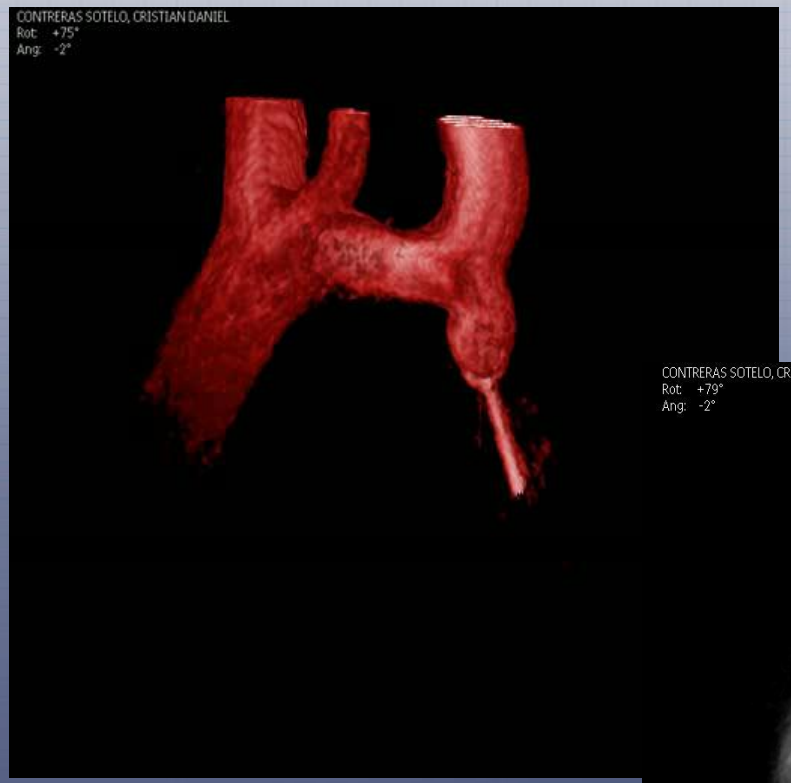


Fig. 2. Additional Information Gleaned From 3DRA.

ANGIOGRAFIA ROTACIONAL 3D

En intervención aórtica





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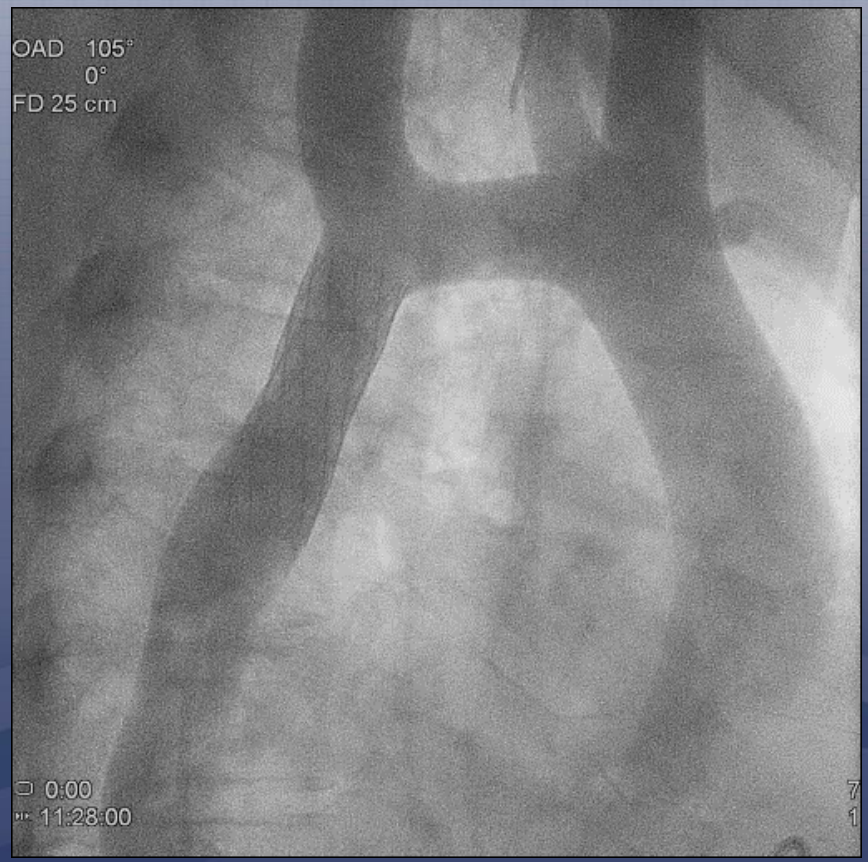
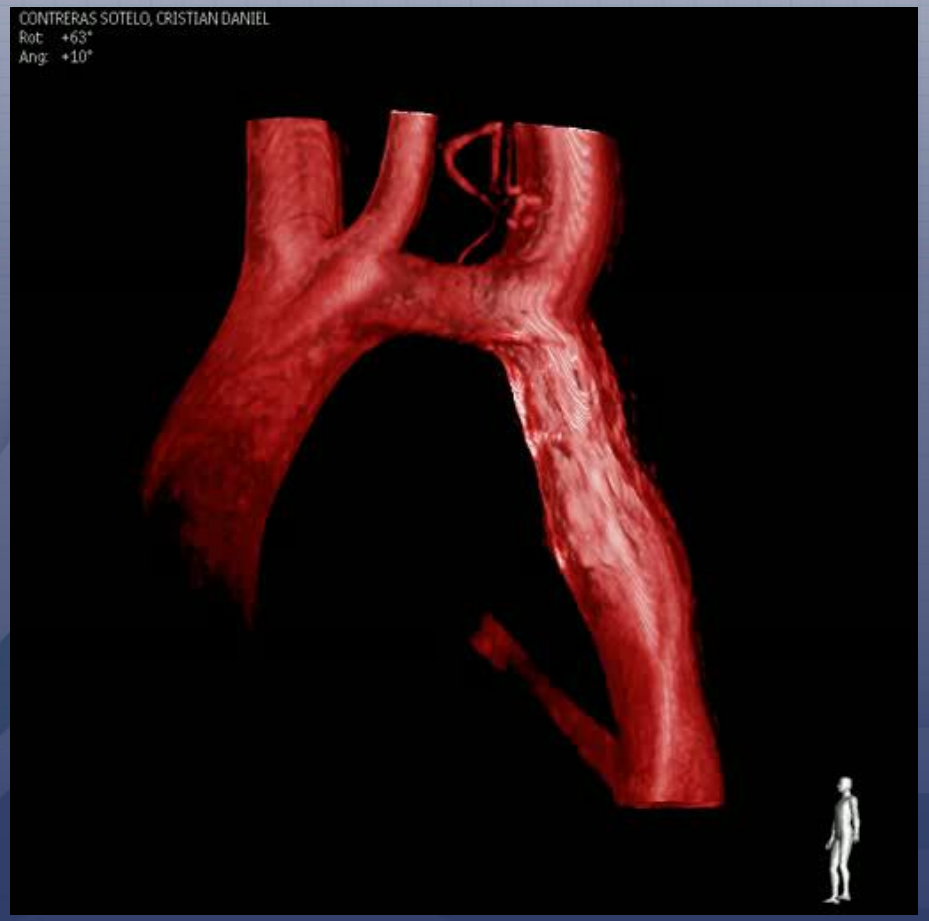
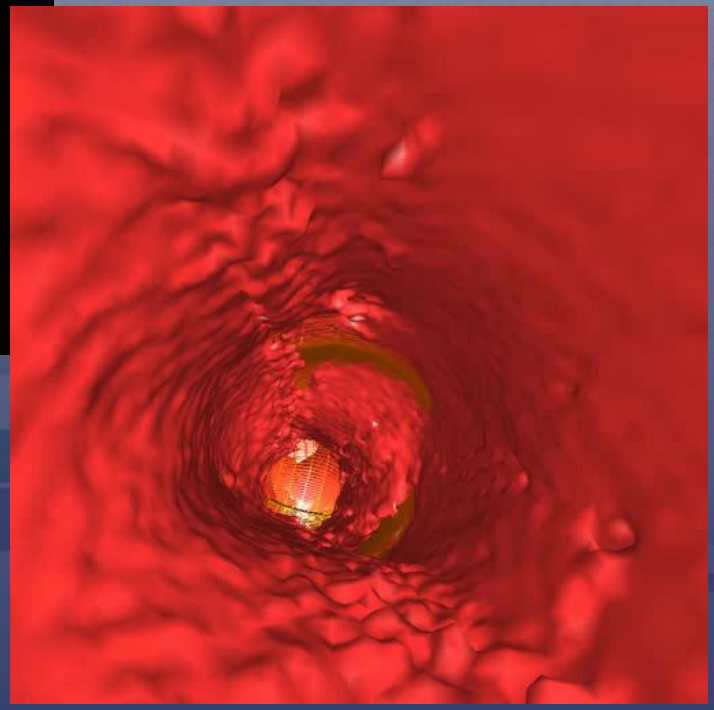


ANGIOGRAFIA ROTACIONAL 3D

En intervención aórtica





En ramas pulmonares

En ramas pulmonares

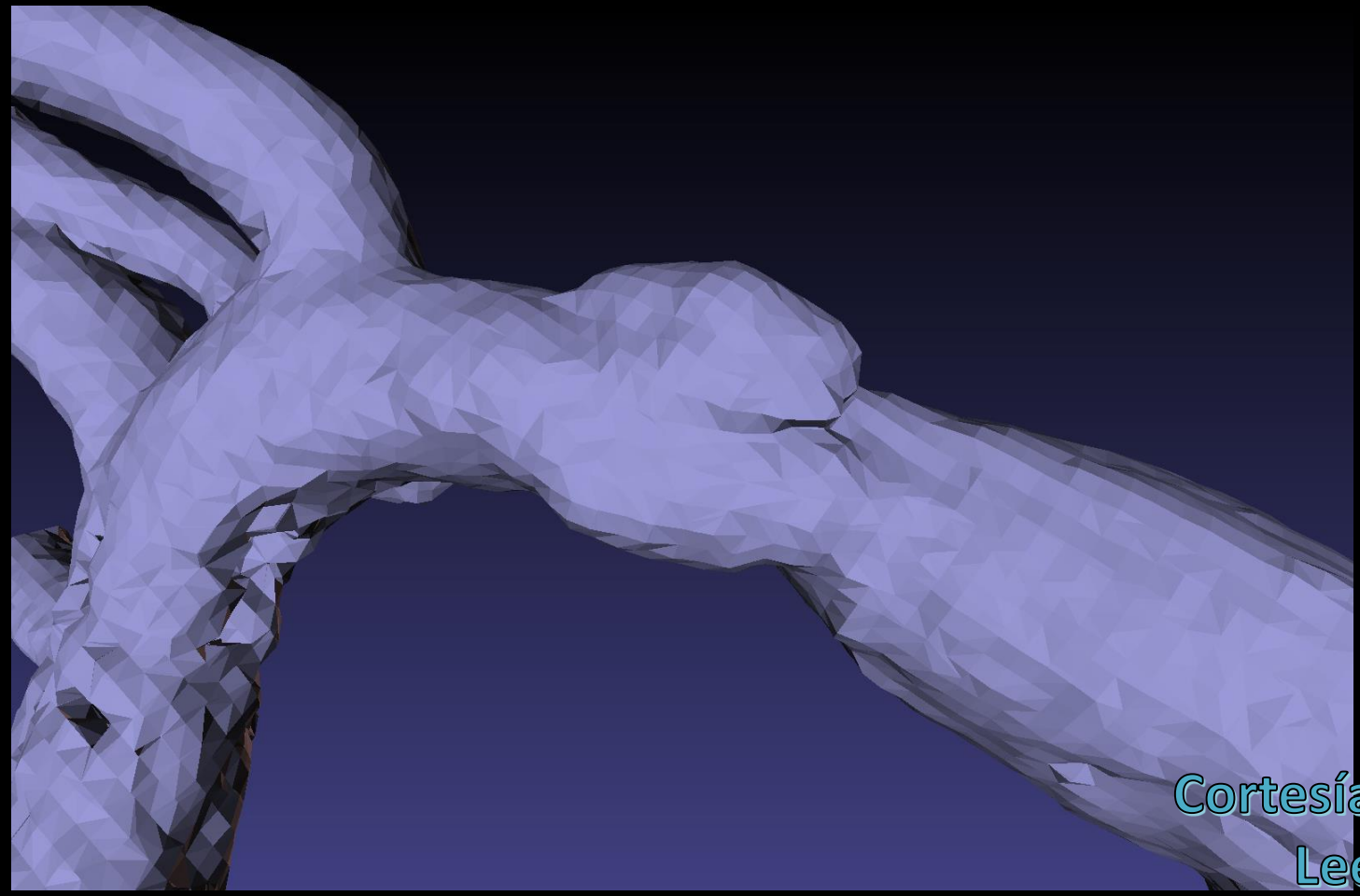
Additional applications of the 3-D data sets

- Resurfacing
- Overlays
- Segmentation
- Modelling
- Fluid dynamics

Cortesía: JP Sandoval
Lee Benson

Additional applications of the 3-D data sets

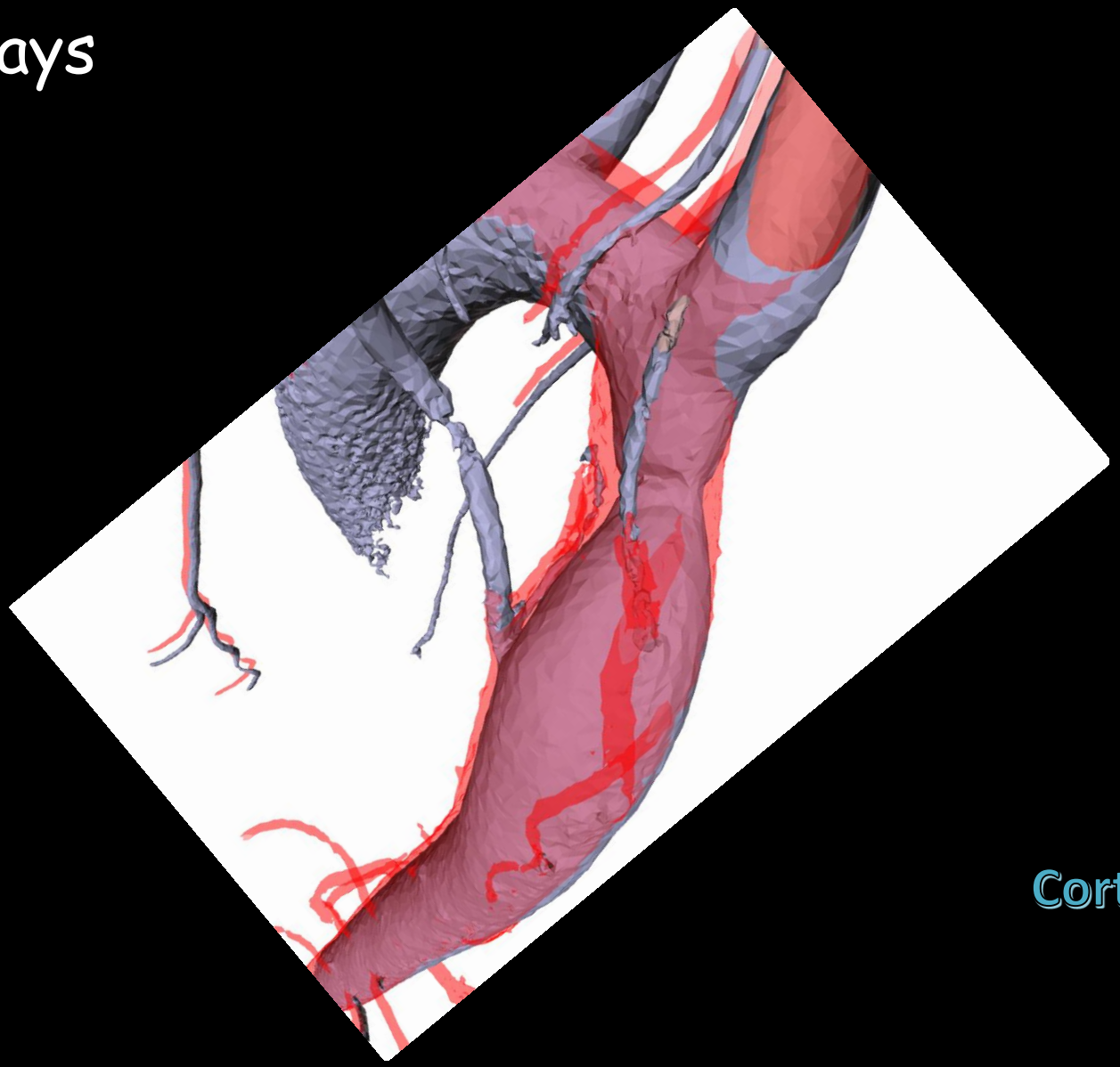
- Resurfacing



Cortesía: JP Sandoval
Lee Benson

Additional applications of the 3-D data sets

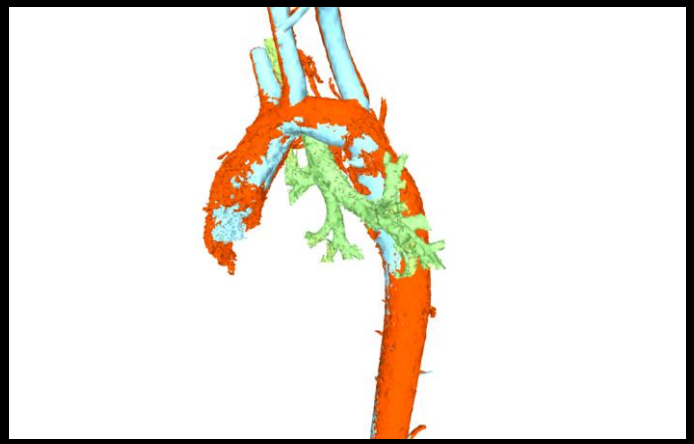
- Overlays

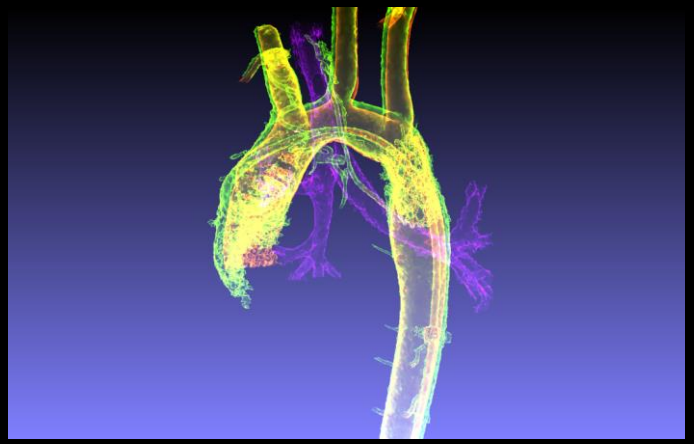


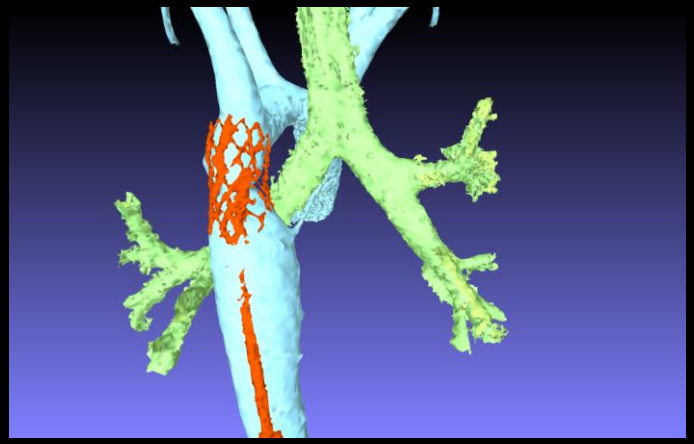
Cortesía: JP Sandoval
Lee Benson

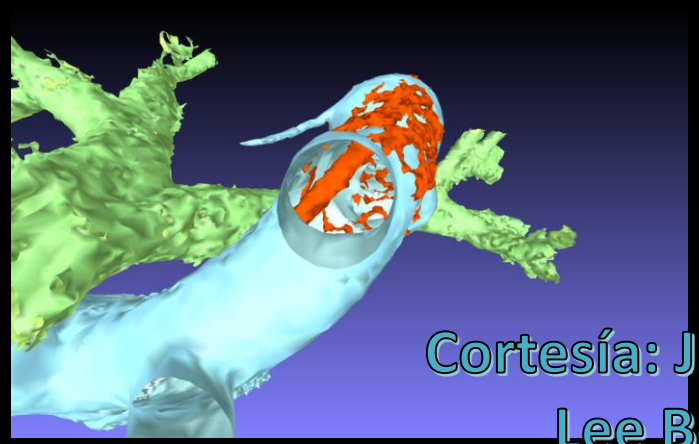
Additional applications of the 3-D data sets

- Overlays and segmentation





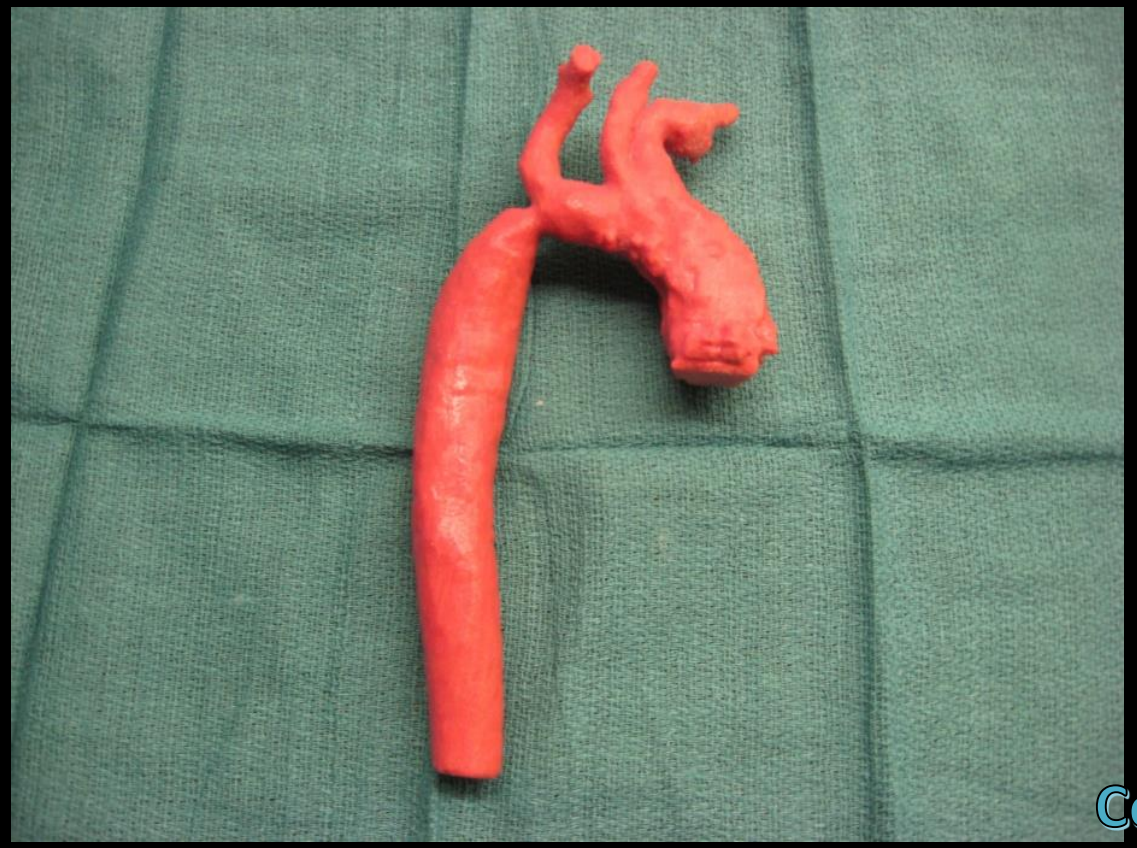




Cortesía: JP Sandoval
Lee Benson

Additional applications of the 3-D data sets

- Modelling



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Additional applications of the 3-D data sets

- Modelling

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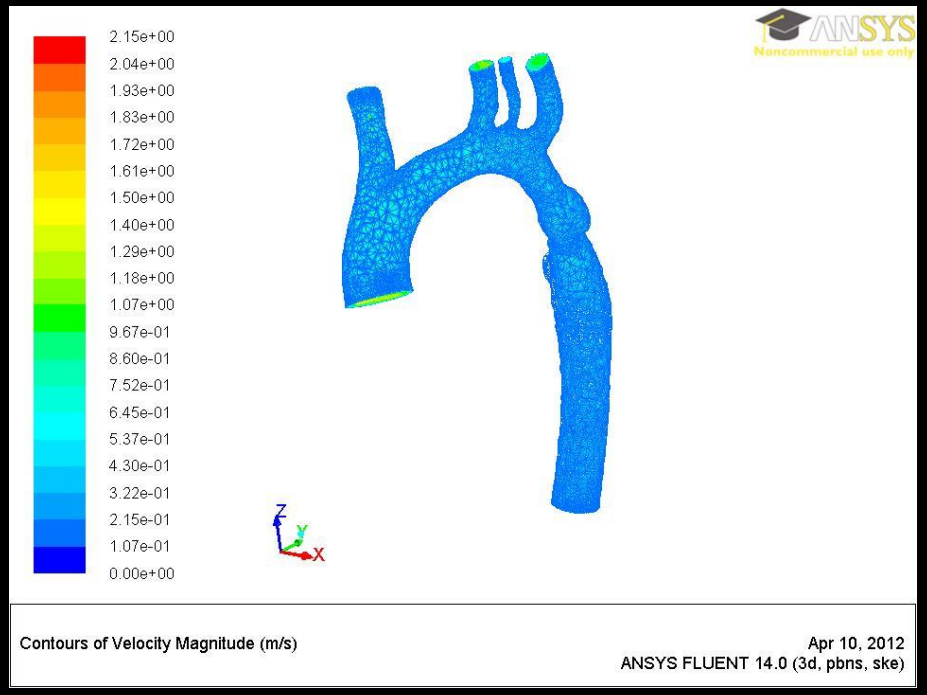
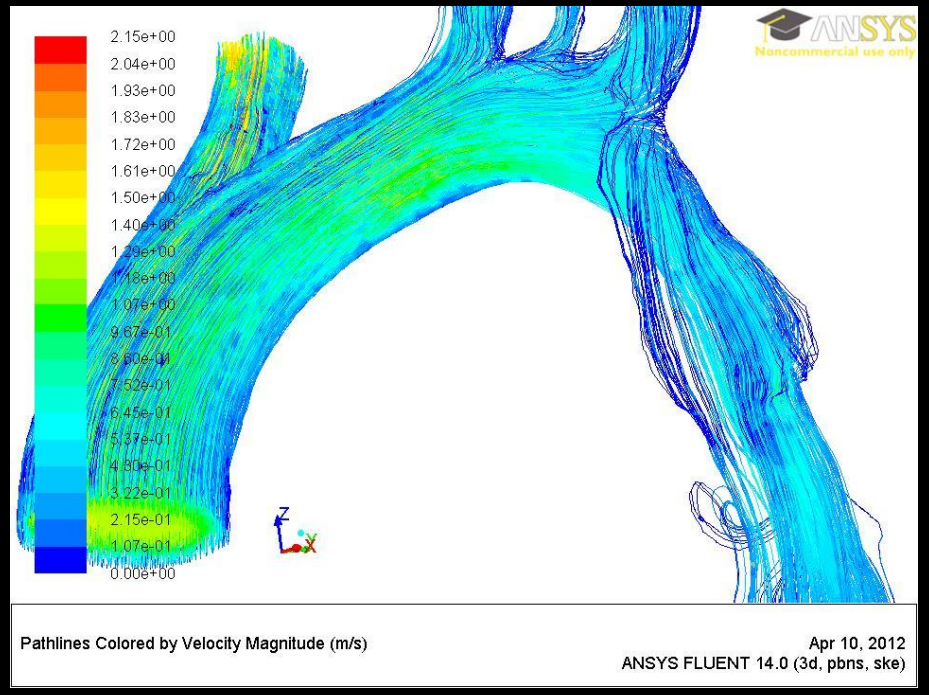
Additional applications of the 3-D data sets

- Fluid dynamics





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