



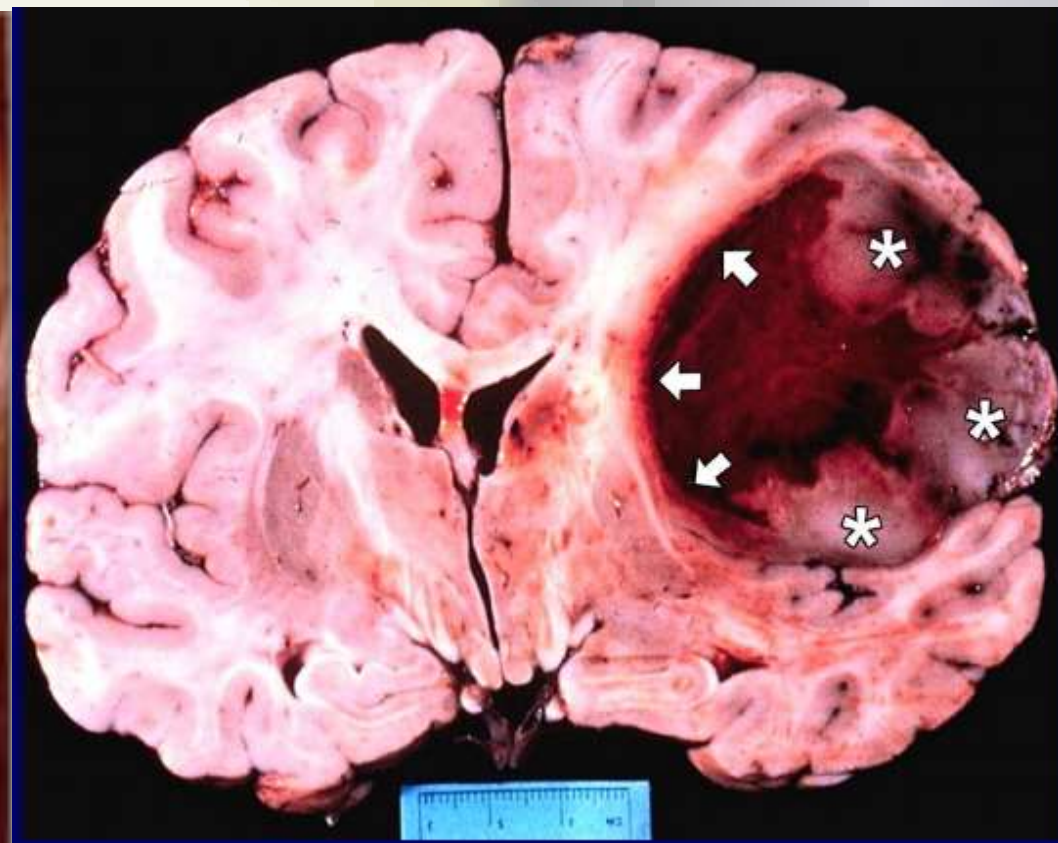
Prof. Agdo. Dr. Ariel Durán, FACC



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ATC OCT de ACD

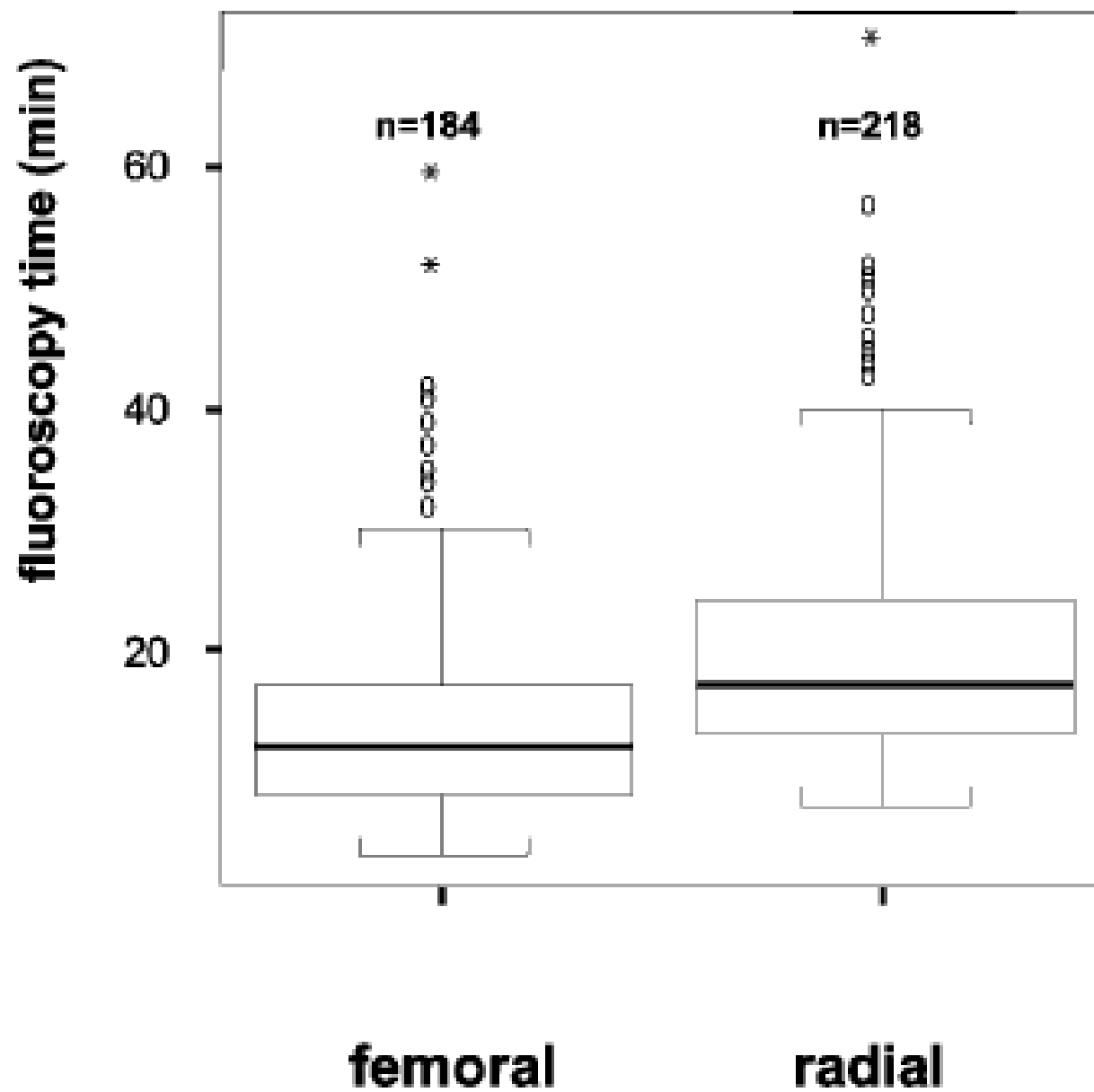


Glioblastoma heteromorfo

Factors influencing fluoroscopy time and dose–area product values during *ad hoc* one-vessel percutaneous coronary angioplasty

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Department of ¹Cardiology and ²Radiology, Institut Mutualiste Montsouris, Paris and ³General Electric Medical System, Buc, France

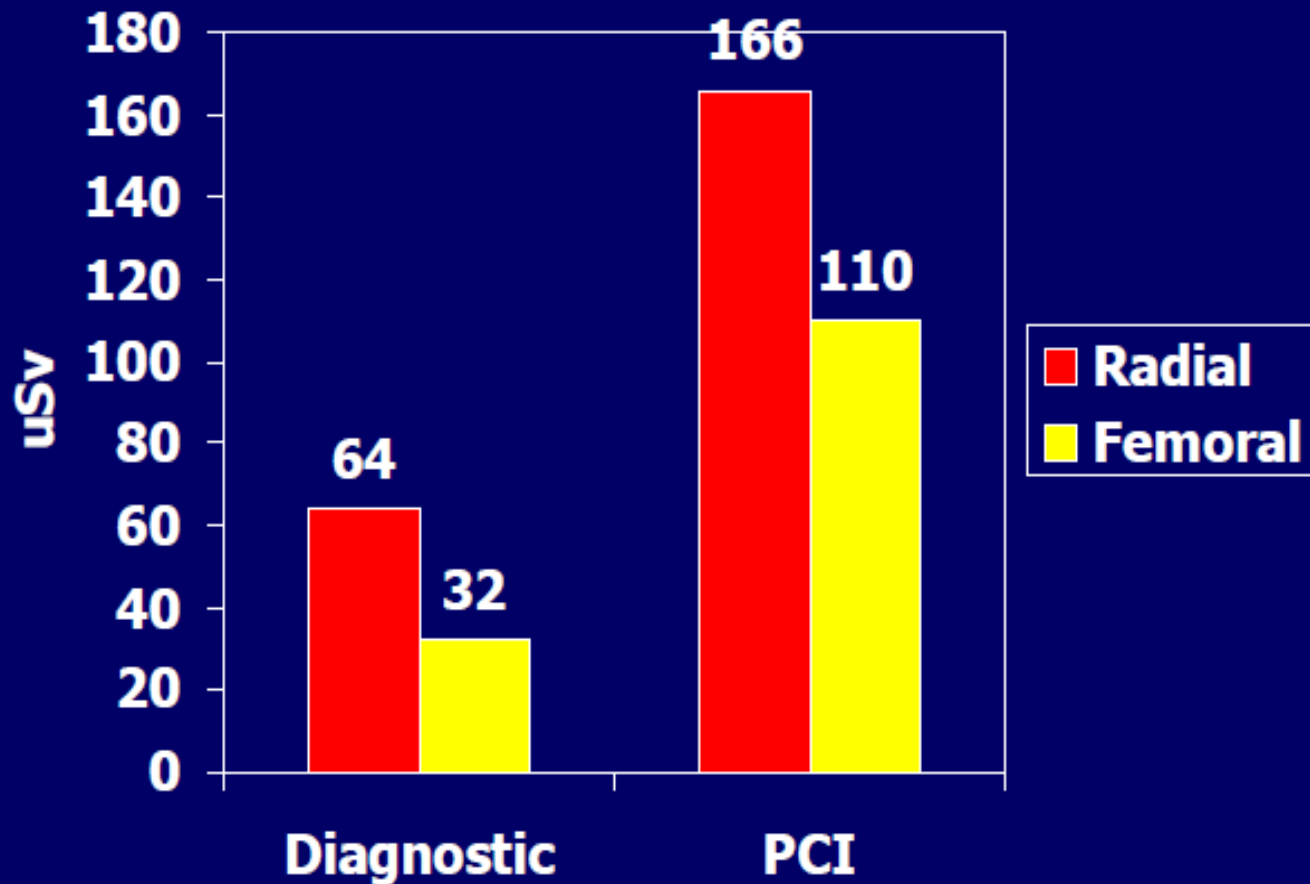


Conclusions

Numerous factors influence patient dose during *ad hoc* one-vessel PTCA. In particular, t and DAP were operator dependent and influenced by the arterial access chosen for catheterization and the stenting strategy.

RCT of Radial vs. Femoral

Randomized
single center
study (n=297)

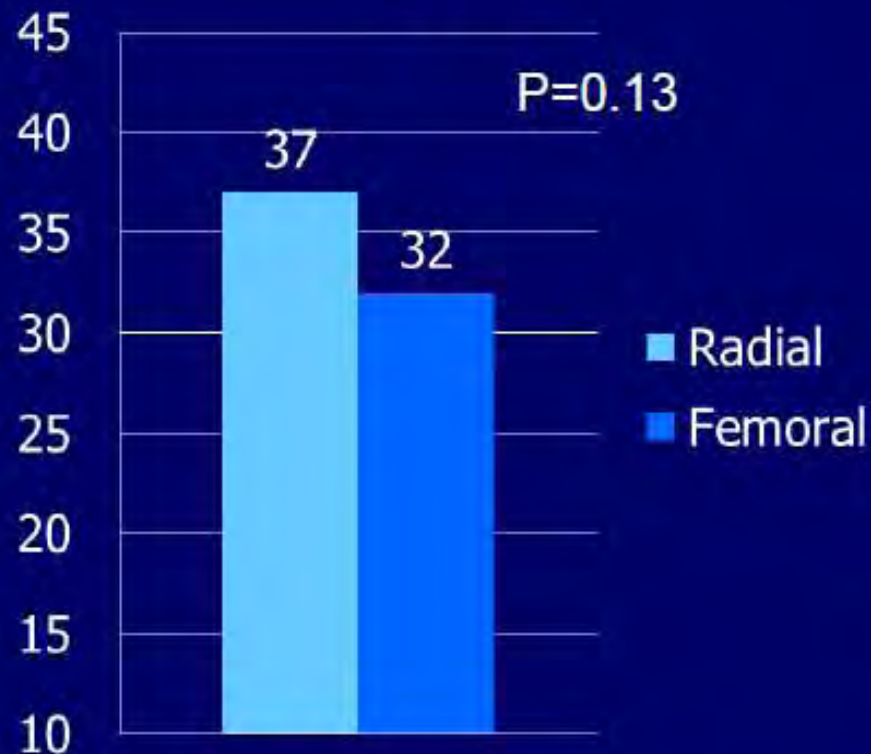


- 100% increase in radiation dose for diagnostic and 50% increase in radiation dose for PCI for cardiologist

RCTs of Radial vs. Femoral

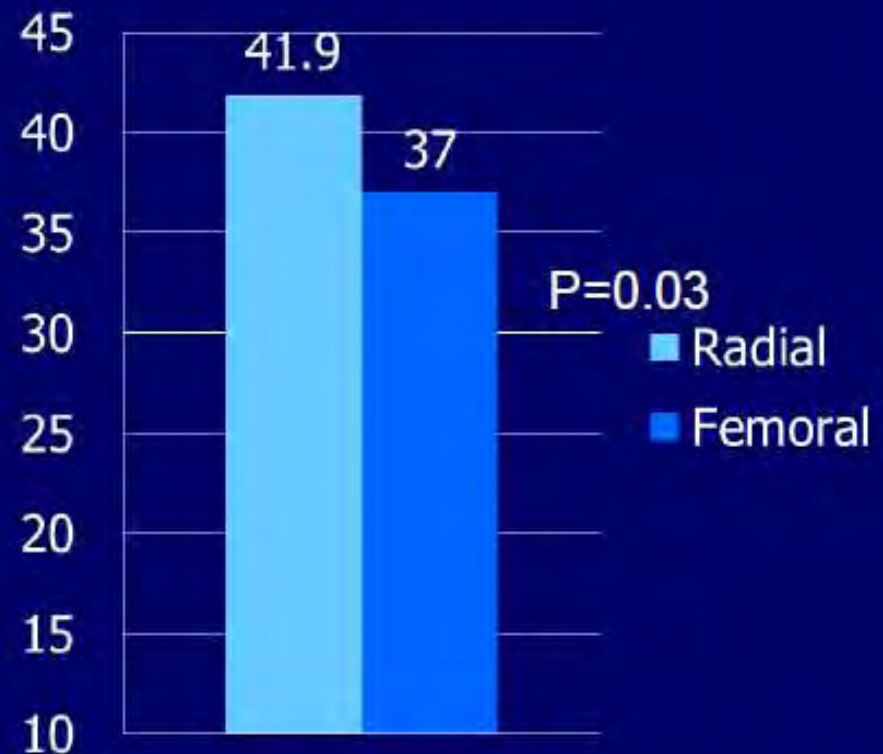
Achenbach (N=307)

DAP



Brueck et al (N=1024)

DAP



Achenbach, et al. CCI. 2008;72:629

Brueck et al. JACC Interv. 2009;2:1047



RIVAL Program

*Radial Versus femorAL access for coronary
intervention study*

A randomized comparison of Radial Vs. femorAL access for coronary intervention in ACS (RIVAL)

SS Jolly, S Yusuf, J Cairns, K Niemela, D Xavier, P
Widimsky, A Budaj, M Niemela, V Valentin, BS Lewis,
A Avezum, PG Steg, SV Rao, P Gao, R Afzal, CD
Joyner, S Chrolavicius, SR Mehta on behalf of the
RIVAL investigators

RIVAL Study Design

**NSTE-ACS and STEMI
(n=7021)**

Key Inclusion:

- Intact dual circulation of hand required
- Interventionalist experienced with both (minimum 50 radial procedures in last year)

Randomization

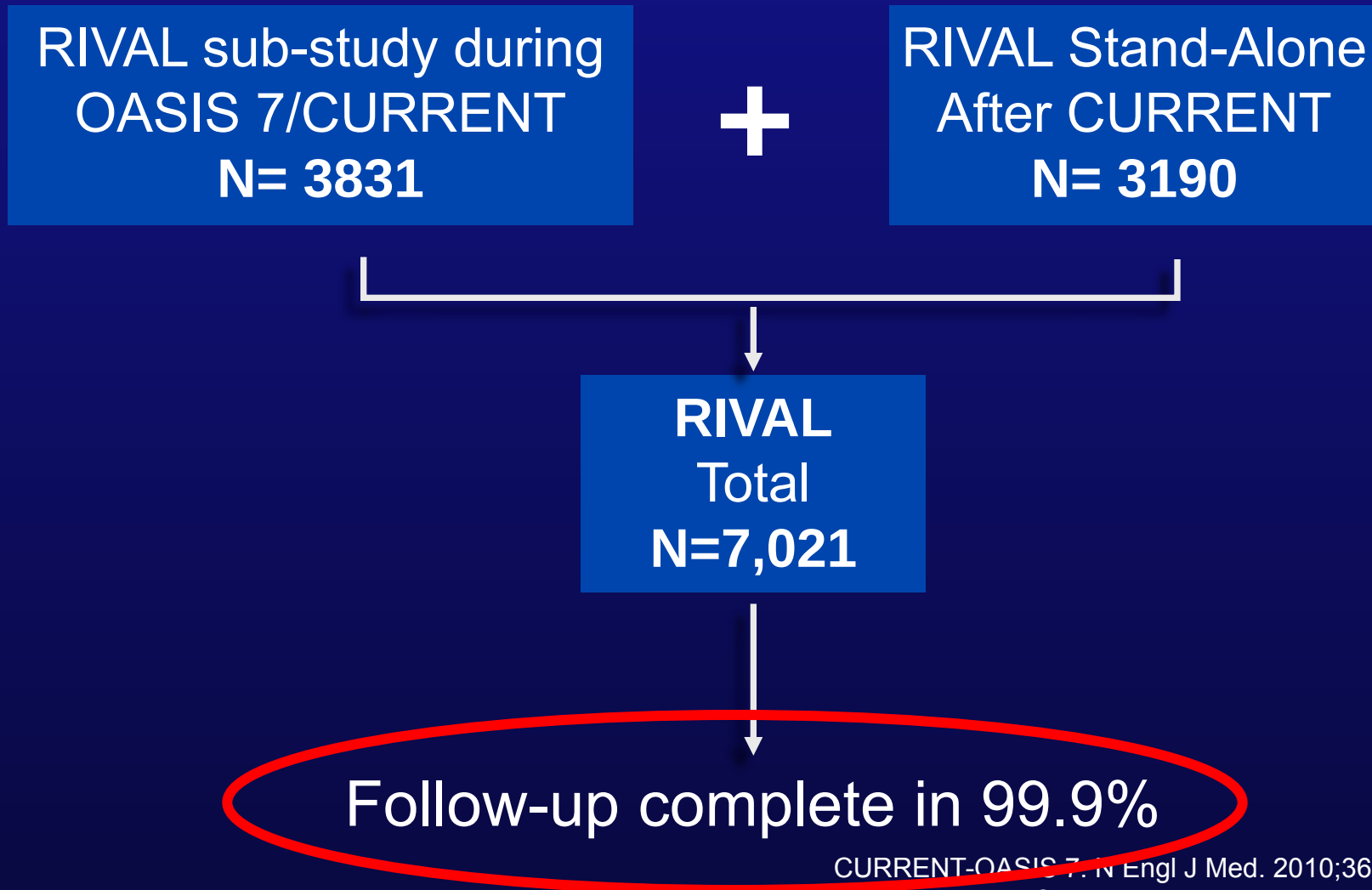
**Radial Access
(n=3507)**

**Femoral Access
(n=3514)**

Blinded Adjudication of Outcomes

**Primary Outcome: Death, MI, stroke
or non-CABG-related Major Bleeding at 30 days**

Final Recruitment





International Study

North America
1614

Europe 3564

Asia
1117

Middle
East/Israel 239

South America 423

Australia and
New Zealand 64

Other Outcomes

	Radial (n=3507)	Femoral (n=3514)	P
Access site Cross-over (%)	7.6	2.0	<0.0001
PCI Procedure duration (min)	35	34	0.62
Fluoroscopy time (min)	9.3	8.0	<0.0001
Persistent pain at access site >2 weeks (%)	2.6	3.1	0.22
Patient prefers assigned access site for next procedure (%)	90	49	<0.0001

- Symptomatic radial occlusion requiring medical attention 0.2% in radial group

Available Online at www.lancet.com (4-2011)

Radial versus femoral access for coronary angiography and intervention in patients with acute coronary syndromes (RIVAL): a randomised, parallel group, multicentre trial

Samir S Jolly, Salim Yusuf, John Cairns, Eiji Niemela, Denis Xavier, Henk Widjansky, Andrzej Budaj, Matti Niemela, Václav Václavík, Basil S Lewis, Alvaro Avezum, Philippe Gabriel Steg, Sumil V Rao, Peggy Gao, Rurwan Afridi, Campbell U Joyner, Susan Chrolavicius, Sharmil Kishore, for the RIVAL Trial group*

Summary

Background Small trials have suggested that radial access for percutaneous coronary intervention (PCI) reduces vascular complications and bleeding compared with femoral access. We aimed to assess whether radial access was superior to femoral access in patients with acute coronary syndromes (ACS) who were undergoing coronary angiography with possible intervention.

Methods The Radial Vs femoral Access for coronary intervention (RIVAL) trial was a randomised, parallel group, multicentre trial. Patients with ACS were randomly assigned (1:1) by a 24 h computerised central automated voice response system to radial or femoral artery access. The primary outcome was a composite of death, myocardial infarction, stroke, or non-coronary artery bypass graft (non-CABG)-related major bleeding at 30 days. Key secondary outcomes were death, myocardial infarction, or stroke; and non-CABG-related major bleeding at 30 days. A masked central committee adjudicated the primary outcome, components of the primary outcome, and stent thrombosis. All other outcomes were as reported by the investigators. Patients and investigators were not masked to treatment allocation. Analyses were by intention to treat. This trial is registered with ClinicalTrials.gov, NCT01014273.

Findings Between June 6, 2006, and Nov 3, 2010, 7021 patients were enrolled from 158 hospitals in 32 countries. 3507 patients were randomly assigned to radial access and 3514 to femoral access. The primary outcome occurred in 128 (3.7%) of 3507 patients in the radial access group compared with 139 (4.0%) of 3514 in the femoral access group (hazard ratio [HR] 0.92, 95% CI 0.72–1.17; $p=0.50$). Of the six prespecified subgroups, there was a significant interaction for the primary outcome with benefit for radial access in highest tertile volume radial centres (HR 0.49, 95% CI 0.28–0.87; $p=0.015$) and in patients with ST-segment elevation myocardial infarction (0.60, 0.38–0.94; $p=0.026$). The rate of death, myocardial infarction, or stroke at 30 days was 112 (3.2%) of 3507 patients in the radial group compared with 114 (3.2%) of 3514 in the femoral group (HR 0.98, 95% CI 0.76–1.28; $p=0.90$). The rate of non-CABG-related major bleeding at 30 days was 24 (0.7%) of 3507 patients in the radial group compared with 33 (0.9%) of 3514 patients in the femoral group (HR 0.73, 95% CI 0.43–1.23; $p=0.23$). At 30 days, 42 of 3507 patients in the radial group had large haematoma compared with 106 of 3514 in the femoral group (HR 0.40, 95% CI 0.28–0.57; $p<0.0001$). Pseudoaneurysm needing closure occurred in seven of 3507 patients in the radial group compared with 23 of 3514 in the femoral group (HR 0.30, 95% CI 0.13–0.71; $p=0.006$).

Interpretation Radial and femoral are approaches are both safe and effective for PCI. However, the lower rate of local vascular complications may be a reason to use the radial approach.

Funding Sanofi-Aventis, Population Health Research Institute, and Canadian Network for Trials Internationally (CANNetIN), an initiative of the Canadian Institutes of Health Research.



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See Online/Comments

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Effect of Radial Versus Femoral Access on Radiation Dose and the Importance of Procedural Volume

A Substudy of the Multicenter Randomized RIVAL Trial

Sanjit S. Jolly, MD, MSc,* John Cairns, MD,† Kari Niemela, MD, PhD,‡

OBJETIVOS: Comparar la dosis de radiación entre ambos accesos recolectando tiempo de fluoro, DAP (equivale a dosis a paciente) y Kerma/área (equivale a dosis a operador).

JACC: CARDIOVASCULAR INTERVENTIONS, VOL. 6, NO. 3, 2013

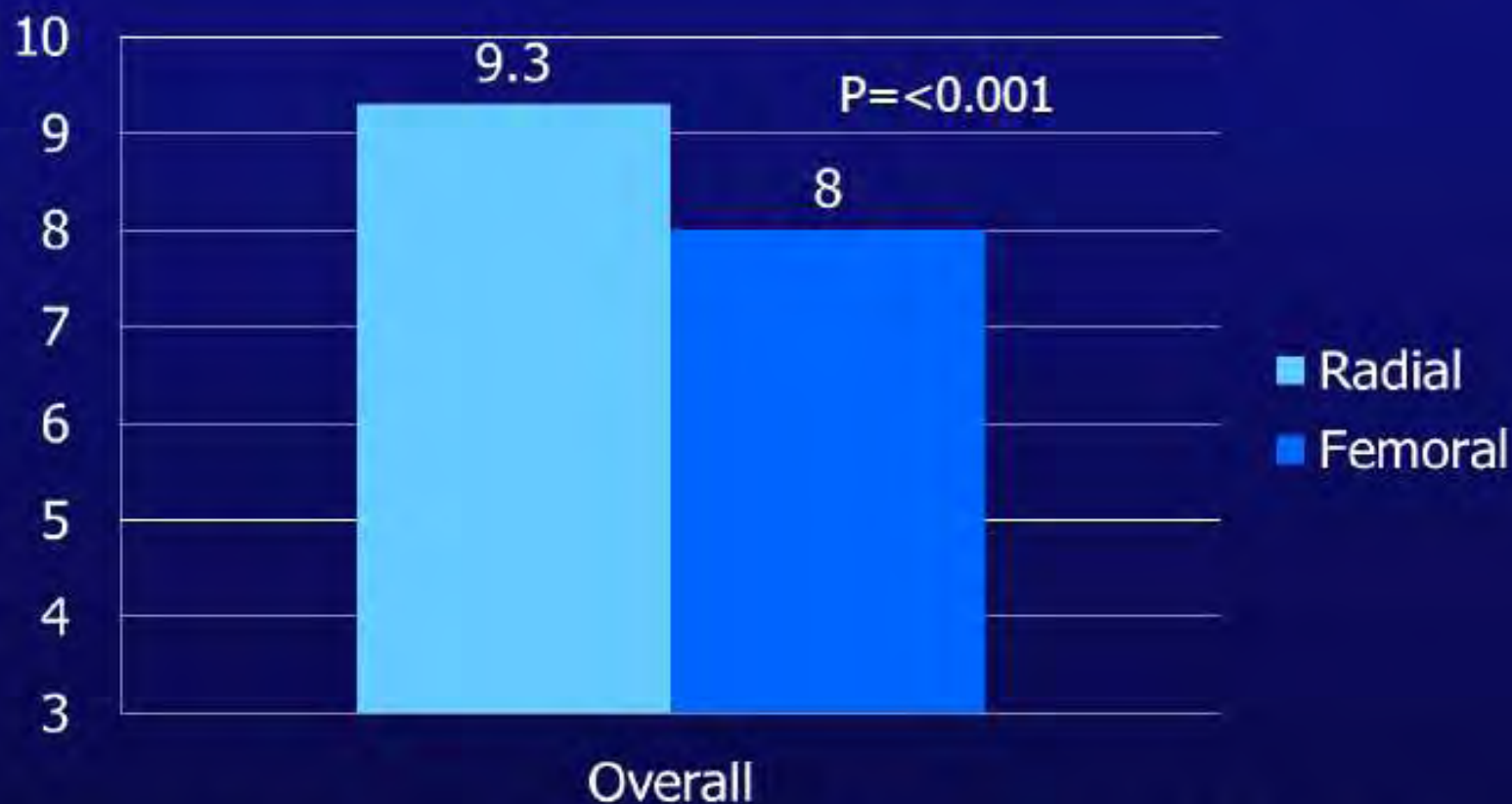
MARCH 2013:258-66

RIVAL Radiation Substudy

- 7021 patients randomized between Radial vs. Femoral in RIVAL
- Centers participating in radiation substudy included 2569 patients

RIVAL Radiation Substudy

Fluoroscopy Time (min)

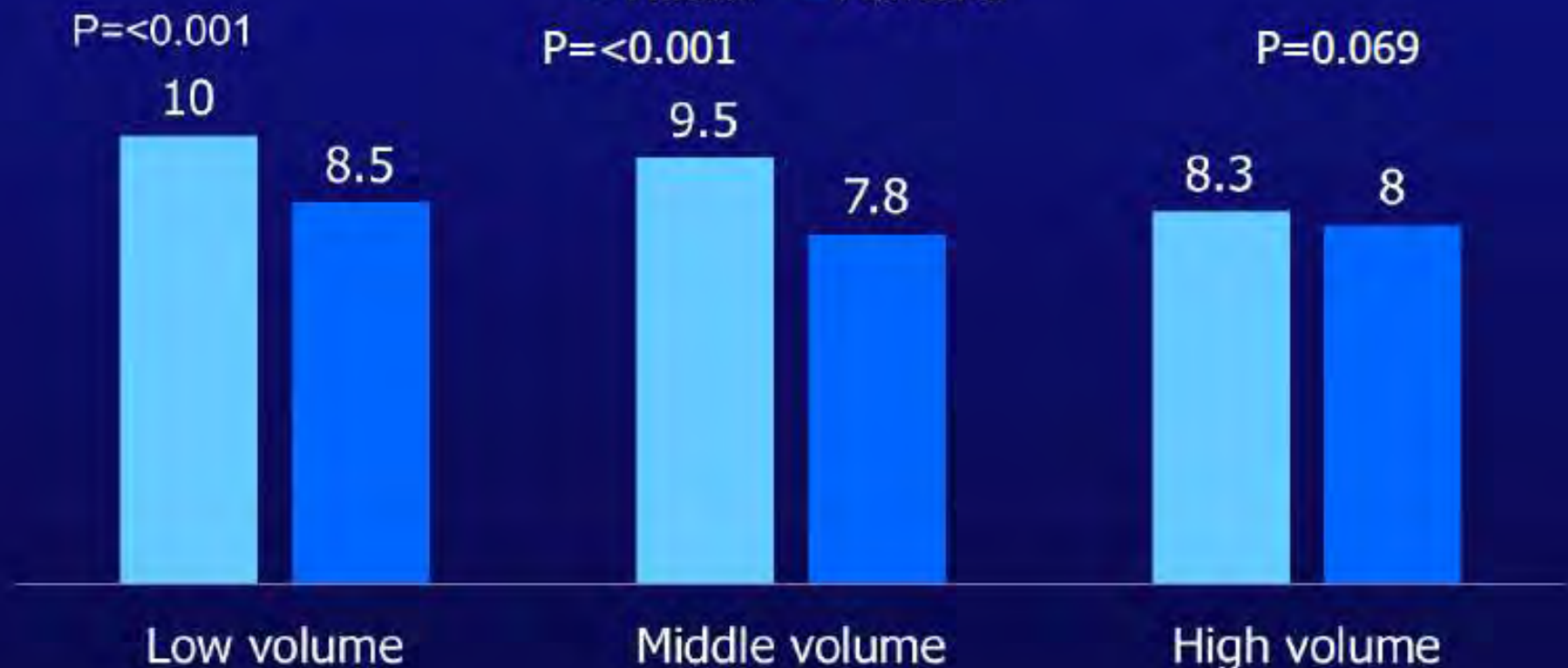


Small Difference in Fluoroscopy time (1 min)

RIVAL Radiation Substudy: Radial Center Volume

Fluoroscopy time

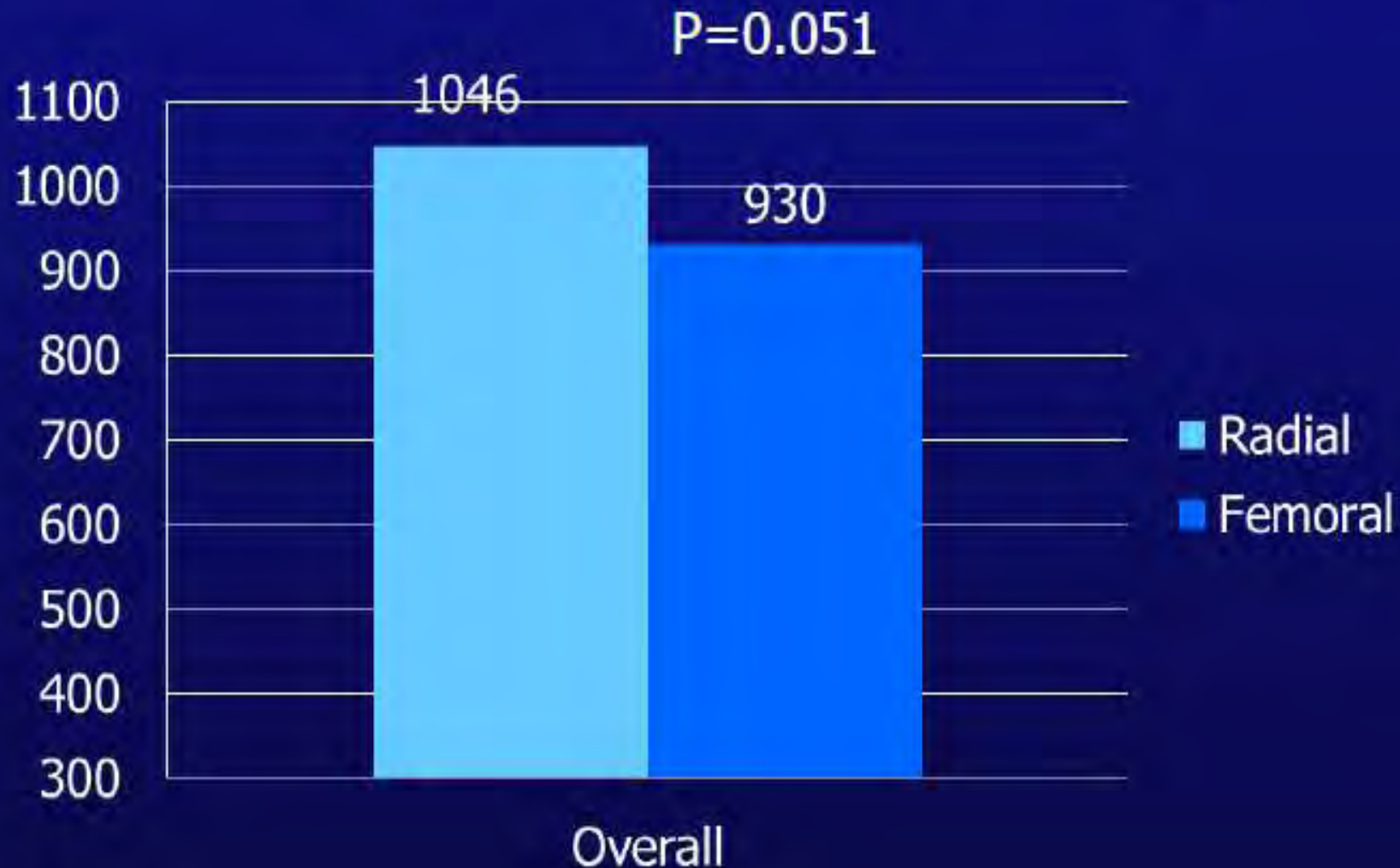
■ Radial ■ Femoral



Difference only present in low and middle volume
Radial Centers

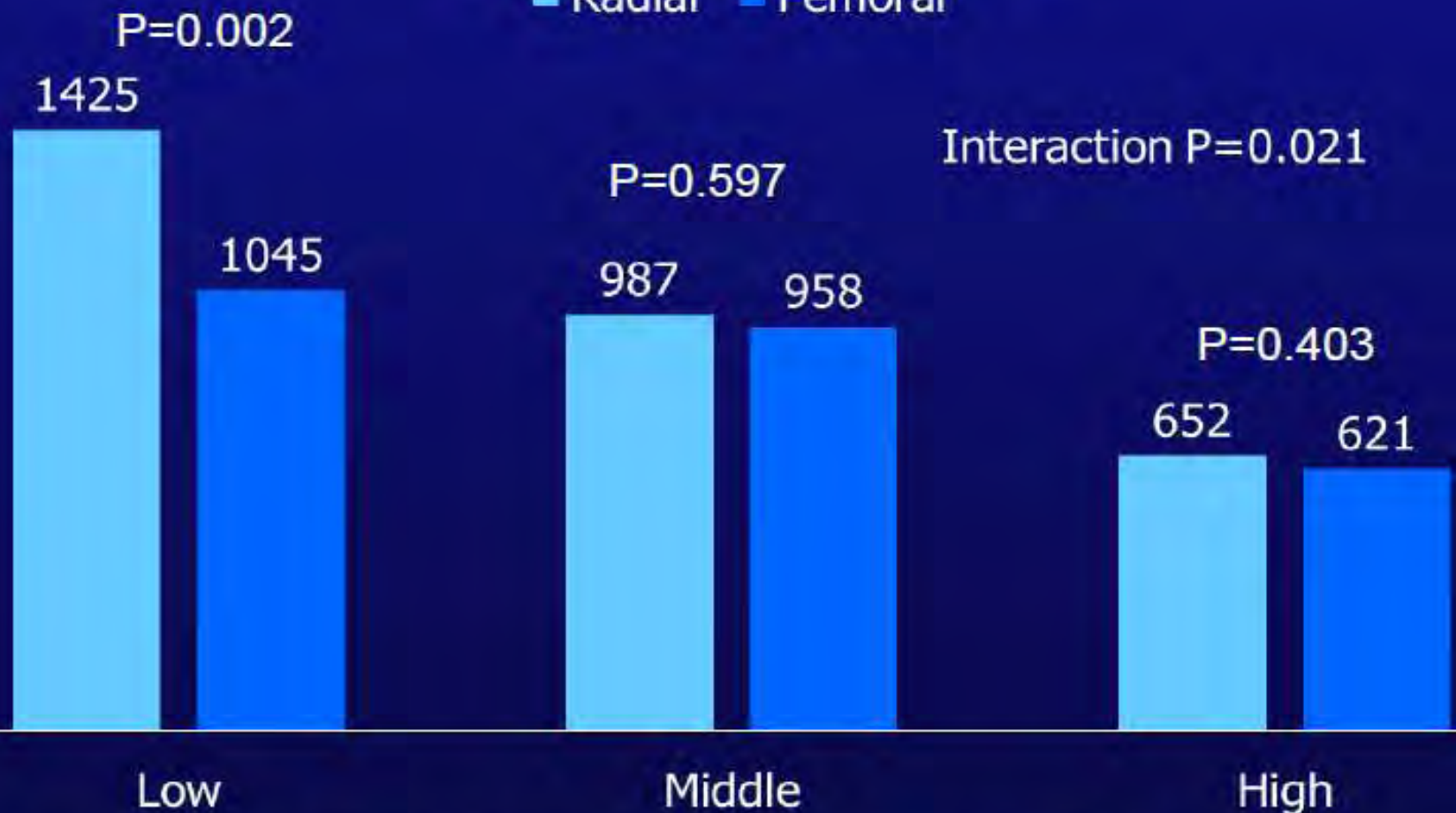
RIVAL Radiation Substudy

Air Kerma (mGy)



Radial Center Volume and Air Kerma (mGy)

■ Radial ■ Femoral



Difference only present in low volume Radial Centers

Summary of RIVAL radiation dose substudy

- Increase in Air Kerma primarily in low volume centers
- High volume centers have lowest radiation dose irrespective of which access site

Measures to reduce Radiation exposure

- Arm should be brought in beside body after access obtained
- Lead Side skirt and top should be used

Transradial Catheterization is Not Associated With Increased Patient Radiation Exposure Compared to Transfemoral Access: A Meta-analysis

Imdad Ahmed, Parikhit Sharma, Pranjal Boruah, Samir Pancholy

The Wright Center for Graduate Medical Education & The Commonwealth Medical College, Scranton, PA

INTRODUCTION

- Radial access coronary procedures are associated with fewer access site complications compared to femoral access. There is controversy regarding greater radiation exposure to patient and operator using radial access.
- We conducted meta-analysis to determine whether transradial catheterization is associated with higher patient's radiation exposure compared to transfemoral access.

METHOD

Study selection

Using keywords angiography, catheterization, radiation, radial artery and femoral artery, we conducted search at major electronic databases from 1950 to May 2012 week 4.

Study eligibility

Studies were included if they met the following criteria:

- 1) an original article;
- 2) included patients who were undergoing coronary angiography/catheterization with or without angioplasty/stent placement;
- 3) reported the radiation exposure in radial and femoral access as comparison; 4) reported patient's radiation exposure without using any experimental shield.

Reviews, comments, surveys, clinical guidelines, single case report, and letters to the editor were also excluded.

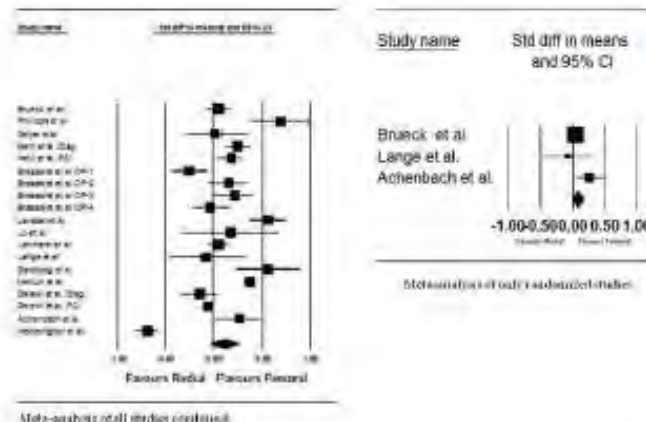
RESULTS

A total of 14 studies (3 randomized, 10 prospective, 1 retrospective) were included for analysis. A meta-analysis of all 14 studies revealed no difference in patient radiation dose between transradial and transfemoral access (standard difference in mean=0.11, 95% CI -0.04 to 0.25, $p=0.15$).

Analysis of the randomized studies alone also showed no difference (standard difference in mean=0.079, 95% CI -0.025 to 0.183, $p=0.14$). Figure-1 shows the forest plot of combined and the randomized studies.

The heterogeneity was high ($I^2=94$) with all studies combined, however the heterogeneity decreased after removal of the observational studies ($I^2=37$).

This indicates that most of the heterogeneity came from the observational studies likely a result of biases inherent to non-randomized studies. Begg and Mazumdar's correlation test showed no indication of publication bias (two tailed $p=0.36$).



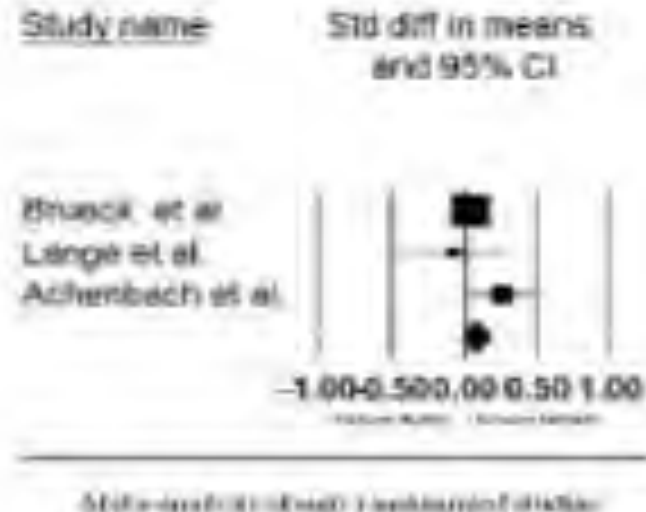
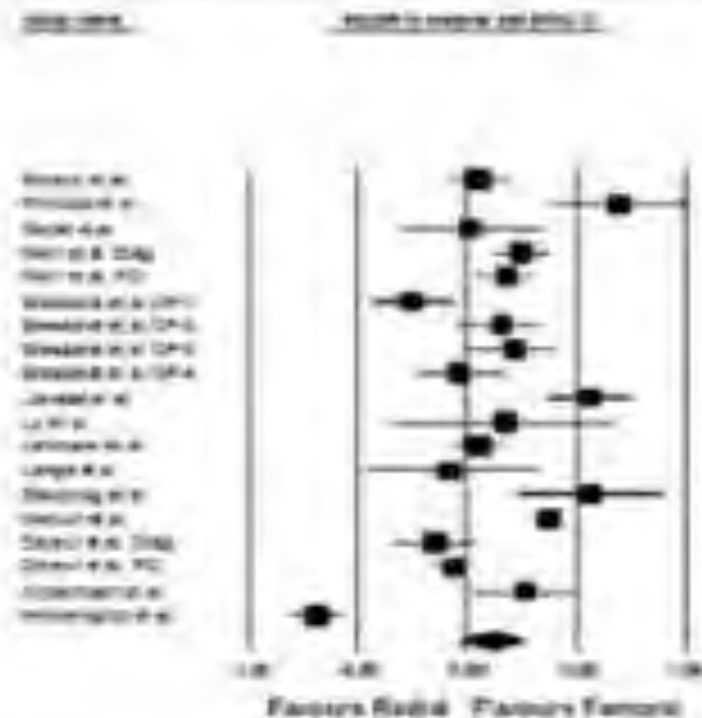
CONCLUSIONS

Transradial catheterization was not associated with higher patient radiation exposure than transfemoral access

TCT2012

Metaanálisis, TCT 2012

- * Ahmed, M. Commonwealth Medical college, PA. 14 estudios: 11 observacionales y 3 randomizados desde 1950 a 2012 iii





Estudio RADIFEMOPROC



Simposio Acceso Radial

Estudio RADIFEMOPROC: Ensayo clínico randomizado que compara la vía radial vs. femoral sobre la dosis ocupacional para primer operador para angioplastias coronarias.

n: 136 pacientes entre julio 2010 y febrero 2011: 42 SF y 94 SM con edad media de 61,2 a (21-84).

Media de edad acceso femoral: 62,5 a
acceso radial: 60,3 a $p=NS$

Criterios de inclusión: Todos los pacientes a los que se les realizó ATC coronaria con más de 18a y sin límite superior realizadas por 3 operadores de nuestro Servicio.

Criterios de exclusión: Shock cardiogénico y pacientes con CABG previa.

La dosimetría ocupacional se midió con dosímetro electrónico colocado por fuera del protector del tiroides modelo DMC 2000 X de RadPro International GmbH, Wermelskirchen-Germany.

RADIFEMOPROC: Demografía

Acceso Femoral: 65 casos
Acceso Radial: 71 casos

3 casos de cross-over de Radial a Femoral.

Peso corporal acceso Femoral: 78,0 kg
p=NS
acceso Radial: 79,5 kg

N° de stents/pac. acceso Femoral: 1,6
acceso Radial: 1,7 p=NS

Tiempo de Radioscopia acceso Femoral: 15,8 mins
Radial: 16,5 mins
p=NS

N° de series filmadas acceso Femoral: 21,4
acceso Radial: 21,7
p=NS

N° de imágenes acceso Femoral: 1892
acceso Radial: 1979 p=NS

Vol. de contraste acceso Femoral: 199cc
acceso Radial: 188cc p=NS

Tiempo de estudio acceso Femoral: 66 mins.
acceso Radial: 72 mins.
p=NS

Dosimetría:

Acceso Femoral: 49,9
microsieverts (DE $\pm$ 46).

Acceso Radial: 69,4
microsieverts (DE $\pm$ 52).

Aumento 39%

$p=0,02$ (test de Student a 2 colas)

Retirando el valor más alto de cada grupo (más del doble del valor anterior) la $p=0,002$

No se observaron diferencias significativas entre ambos accesos en relación a tiempo del estudio, n° de vasos tratados, n° de stents implantados, vol. de contraste, tiempo de radioscopía, n° de series, imágenes filmadas o tiempo total del estudio.

Sin embargo se observó una significativa mayor dosis (39%) ocupacional recibida por el primer operador a nivel del cuello (que se extrapola a dosis de cristalino) en el acceso radial comparado con el acceso femoral.

International Conference on
**RADIATION PROTECTION
IN MEDICINE**

Setting the Scene
for the Next Decade

3–7 December 2012
Bonn, Germany

Organized by the

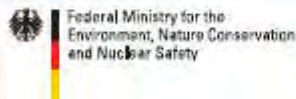


Co-sponsored by the



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Government of Germany

through the



Meeting Participants for J1-CN-192

International Conference on Radiation Protection in
Medicine - Setting the Scene for the Next Decade

PROCEEDINGS

Bonn

2012-12-03 - 2012-12-07

RANDOMIZED COMPARISON OF OCCUPATIONAL DOSE BETWEEN RADIAL AND FEMORAL ACCESS FOR PERCUTANEOUS CORONARY INTERVENTION - RADIFEMOPROC TRIAL

A. DURAN, P. TRUJILLO, I. DURO, P. DIAZ

Medica Uruguaya Hospital, Montevideo, Uruguay.

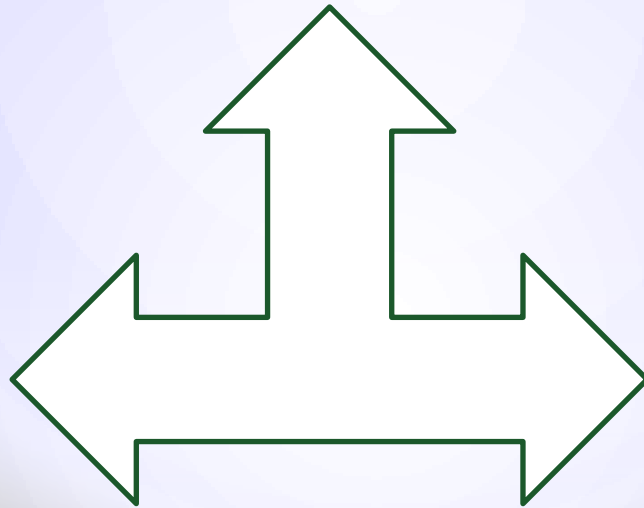
E-mail address of main author: aduran@hc.edu.uy, dr.arielduran@gmail.com

¿Cuál radial?

¿Derecha?



¿Izquierda?



Operator Radiation Exposure and Physical Discomfort during a Right versus Left Radial Approach for Coronary Interventions: A Randomized Evaluation

Ambar M Patel M.D., Herman Kado M.D., Siva Suryadevara M.D., Dominick Angiolillo M.D., Martin Zenni M.D., Lyndon Box M.D., Theodore A Bass M.D., Luis A Guzman M.D.

Introduction

- The Transradial approach (TRA) is widely being adopted as the preferred method of access for coronary angiography.
- Currently, it is estimated that nearly 80% of all transradial cases are performed using right radial approach (RRA).
- This may be due to the fact that fluoroscopy suites are designed as such making RRA a more convenient approach with perceived less operator discomfort.
- Left radial approach (LRA) may have some advantages over the RRA such as decreased tortuosity and better catheter support.
- Previous studies have demonstrated a significant difference in the amount of fluoroscopy time (FT), environmental radiation exposure as well as radiation exposure to the patient comparing the two approach.
- However, little data exist showing direct operator radiation exposure and operator physical discomfort when comparing right versus left radial approach.

Study Aim

- The aim of this study is to determine a difference in direct operator radiation exposure and physical discomfort using a LRA versus a RRA.

Methods

- Inclusion Criteria:** All patients that presented to catheterization lab for diagnostic angiography and percutaneous coronary intervention (PCI) between July 1, 2011 and October 31, 2012 that were considered appropriate by the operator to undergo a TRA.
- Exclusion Criteria:** Patients with AV grafts, prior CABG surgery or ST-elevation myocardial infarction, lack of radial pulse, competitive trials, need for femoral approach for high risk interventions and physician preference.
- Randomization process:** To prevent imbalances, patients were stratified by BMI and each operator had an independent randomization.
- Radiation Badges:** Separate sets of Radiation dosimeter badges (RDB) were placed on external head, external thyroid and internal sternum for each operator.
- The total radiation dose obtained from RDB for each operator was adjusted based on FT of each case to obtain the actual dose/case.
- Operator physical discomfort** (back, leg, neck pain) was surveyed and graded from 0-10 scale at two distinct time points: after vascular access and at the end of the procedure. Moderate to severe operator physical discomfort was defined as ≥ 5 .
- Primary end point of the study:** Difference in total radiation dose, Head, External Thyroid and Internal Sternum between LRA vs RRA.
- Secondary end points:** Operator physical discomfort, procedural success, fluoroscopy time (FT), scenes, total contrast, total catheters.

Figure 1: Study Flow Diagram

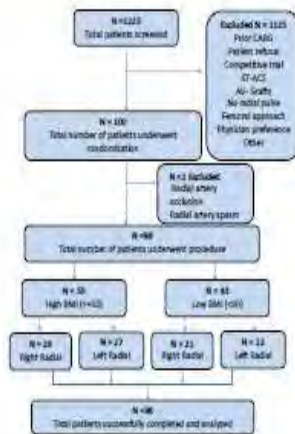
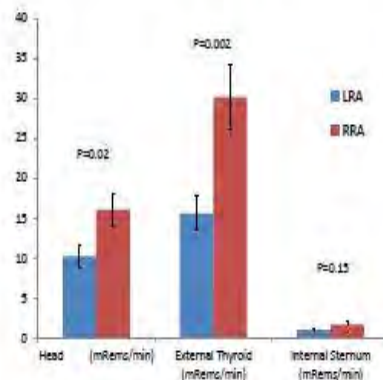


Figure 2: Primary Study Endpoint: Operator Radiation Exposure Left vs Right Radial Approach



Results

Table 1: Baseline patient demographics

	LRA(n=50)	RRA(n=50)	p-value
Age	57.97 ± 10.66	60.66 ± 8.89	0.29
BMI	31.90 ± 8.4	30.80 ± 6.6	0.49
Male	30 (61 %)	29 (59 %)	0.71
Caucasian	29 (59 %)	30 (61 %)	0.71
History of CAD	24 (49 %)	29 (59 %)	0.34
History prior PCI	18 (37 %)	24 (49 %)	0.33
History of PVD	2 (4 %)	2 (4 %)	0.98
History of CPE	3 (6 %)	6 (12 %)	0.54
Hypertension	40 (81 %)	43 (86 %)	0.52
Diabetes	25 (51 %)	27 (55 %)	0.53
Dyslipidemia	35 (71 %)	39 (79 %)	0.51
Tobacco use	27 (55 %)	31 (63 %)	0.53
Indication: ACS	25 (51 %)	30 (61 %)	0.32

(Data are presented as mean ± SD or as median (percentage).
Cardiovascular risk factors were defined as having diabetes, history coronary artery disease.

Table 2: Comparative analysis of procedural variables and radiation exposure for Left vs Right radial approach

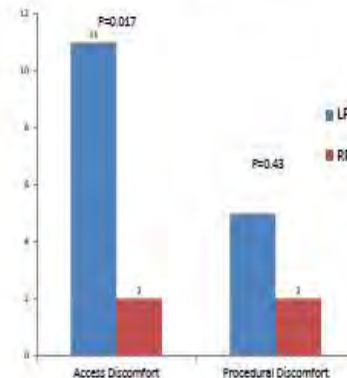
	LRA(n=50)	RRA(n=50)	p-value
Procedural Success	48 (96%)	48 (96%)	1.00
FT (min)	10.5 ± 7.9	10.9 ± 8.0	0.82
Scenes	13.7 ± 8.5	14.4 ± 9.4	0.71
Contrast (ml)	110.1 ± 58.8	104.55 ± 60.0	0.65
Catheters	3.02 ± 1.8	2.78 ± 1.4	0.45

Table 3: Operator Radiation Exposure and BMI Left vs Right Radial Approach

BMI <30	LRA(n=22)	RRA(n=21)	p-value
External Head	8.85 ± 9.56	16.62 ± 14.31	0.04
External Thyroid	12.89 ± 12.70	31.81 ± 32.40	0.01
Internal Sternum	0.68 ± 1.15	1.57 ± 3.53	0.27

BMI ≥30	LRA (n=27)	RRA (n=29)	p-value
External Head	11.37 ± 10.70	15.64 ± 13.85	0.21
External Thyroid	17.77 ± 16.34	28.94 ± 25.22	0.05
Internal Sternum	1.25 ± 1.60	1.74 ± 1.80	0.36

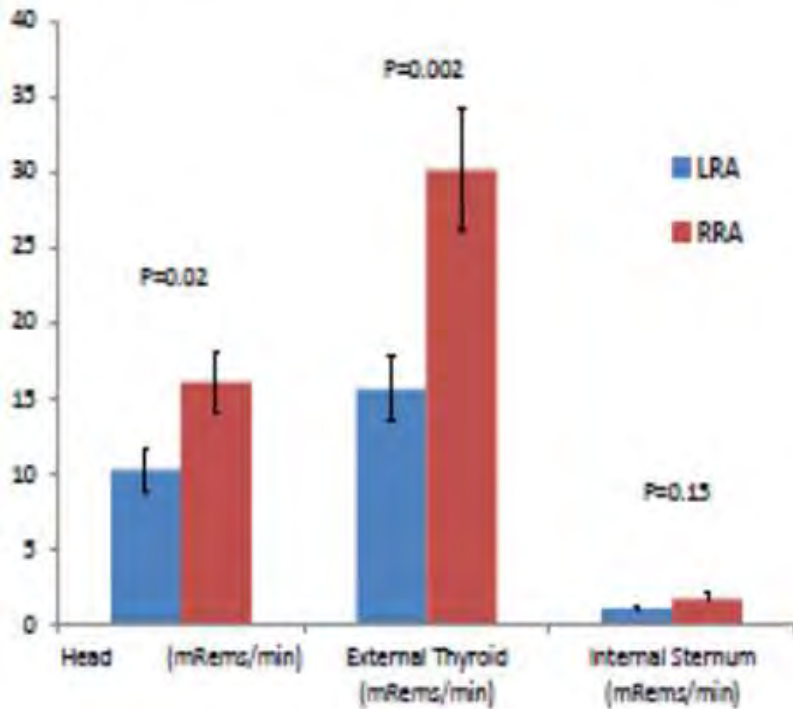
Figure 3: Operator Discomfort Left vs Right Radial Approach



Conclusions

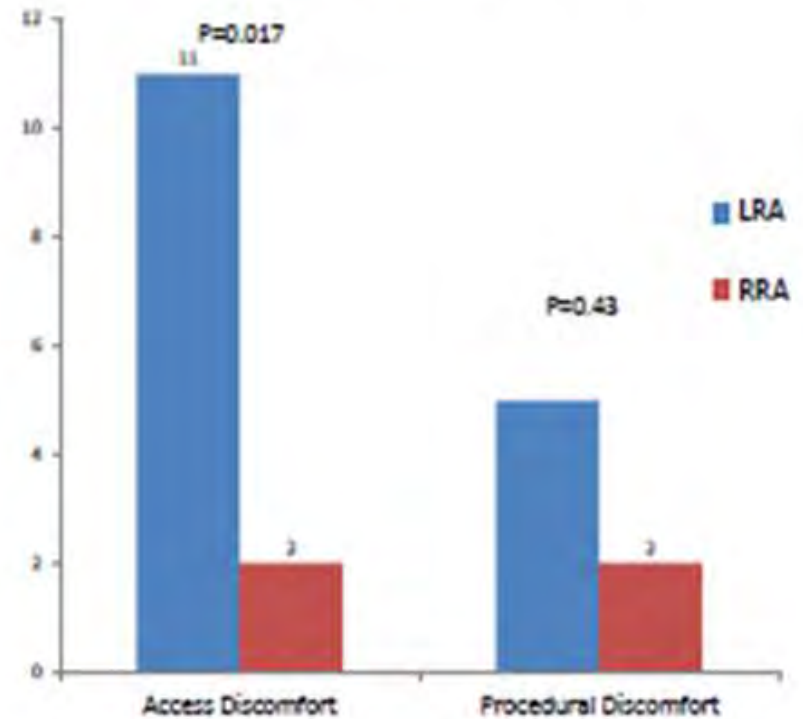
- The procedural success of left radial approach is comparable to the right radial approach, with very similar procedural time, number of scenes and radiation exposure to the patient.
- There is a significant decrease in radiation exposure to the operator using the left radial approach.
- The decreased radiation was seen mainly in the thyroid and head area with a trend towards increased radiation exposure to the sternum.
- Left radial approach is associated with more discomfort only during vascular access but none during the procedure.

Figure 2: Primary Study Endpoint: Operator Radiation Exposure
Left vs Right Radial Approach



Radiación al primer operador

Figure 3: Operator Discomfort
Left vs Right Radial Approach



Discomfort del primer operador

Conclusions

- The procedural success of left radial approach is comparable to the right radial approach, with very similar procedural time, number of scenes and radiation exposure to the patient.
- There is a significant decrease in radiation exposure to the operator using the left radial approach.
- The decreased radiation was seen mainly in the thyroid and head area with a trend towards increased radiation exposure to the sternum
- Left radial approach is associated with more discomfort only during vascular access but none during the procedure

JACC Intervention 2014, July

JACC Cardiovasc Interv. 2014 Jul;7(7):810-6. doi: 10.1016/j.jcin.2013.11.026.
Epub 2014 Jun 18.

Operator radiation exposure and physical discomfort during a right versus left radial approach for coronary interventions: a randomized evaluation.

Kado H(1), Patel AM(1), Suryadevara S(1), Zenni MM(1), Box LC(1), Angiolillo DJ(1), Bass TA(1), Guzman LA(2).

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Electronic address: luis.guzman@jax.ufl.edu.

ESTUDIO RID (primeros 70 pacientes)

Der.

Izq.

T. de fluoro: 8,6 mins

13,34 mins

Dos. 1° Op: 3,27 mGy

4,92 mGy

PDA: 6,774 μGym^2

10740 μGym^2

Increased radiation exposure in transradial approach:

A REAL DRAWBACK OR AN OBSOLETE PROBLEM?

Škvařil J, Kočková R, Jarkovský P, Sedloň P, Černohous M, Daničková K*

Department of Cardiology, Military Hospital, Prague, Czech Republic

**Institute of Clinical and Experimental Medicine, Prague, Czech Republic*

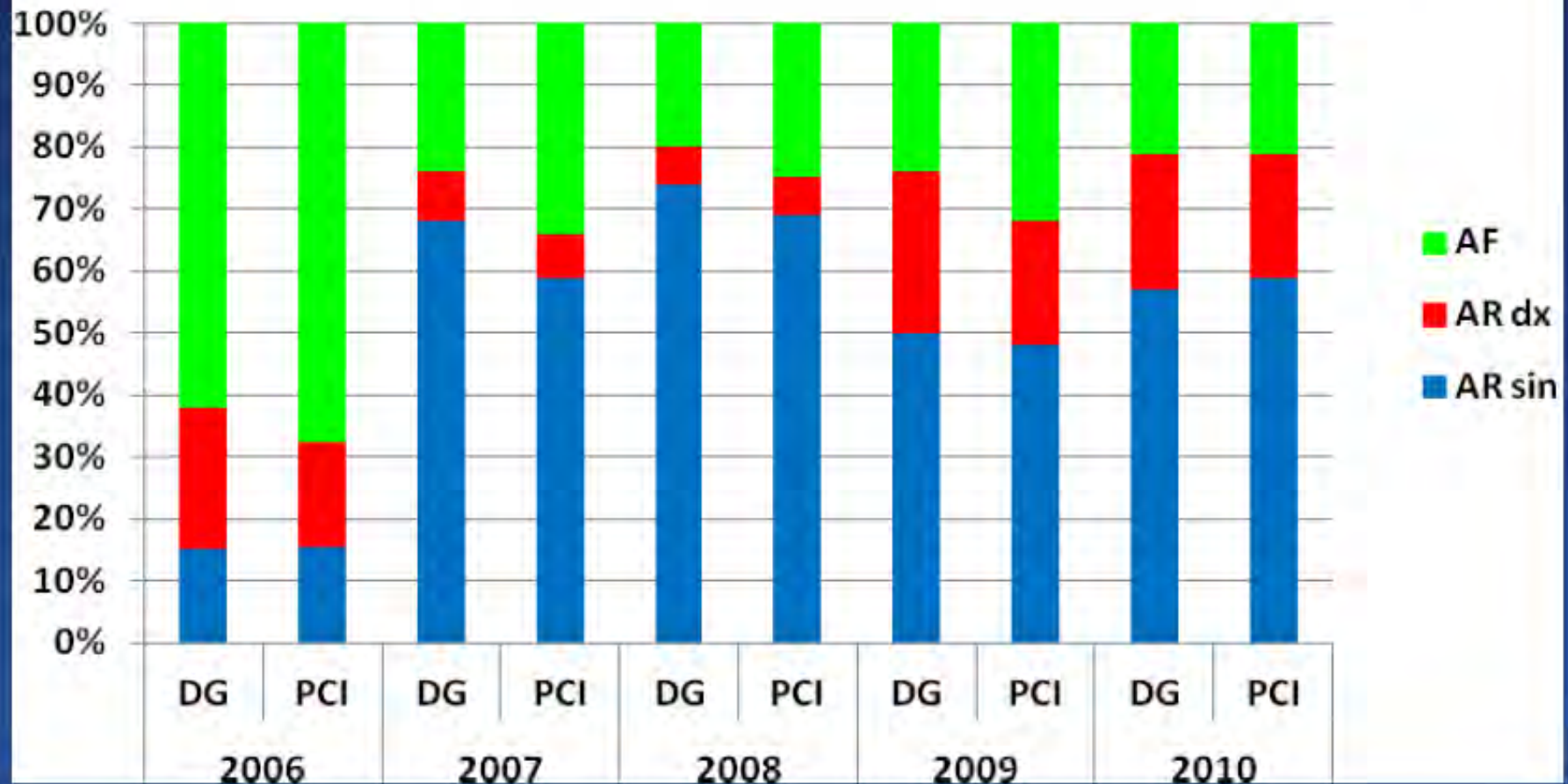
Substantial questions concerning radiation exposure :

- How the radiation exposure is defined and expressed? Units used.
- To whom it relates (physicians x patients) ?
- Experience with TRA (learning curve, workplace, study protocol, etc.).

Cathlab of Central Military Hospital Prague

Frequency distribution of individual vascular approaches

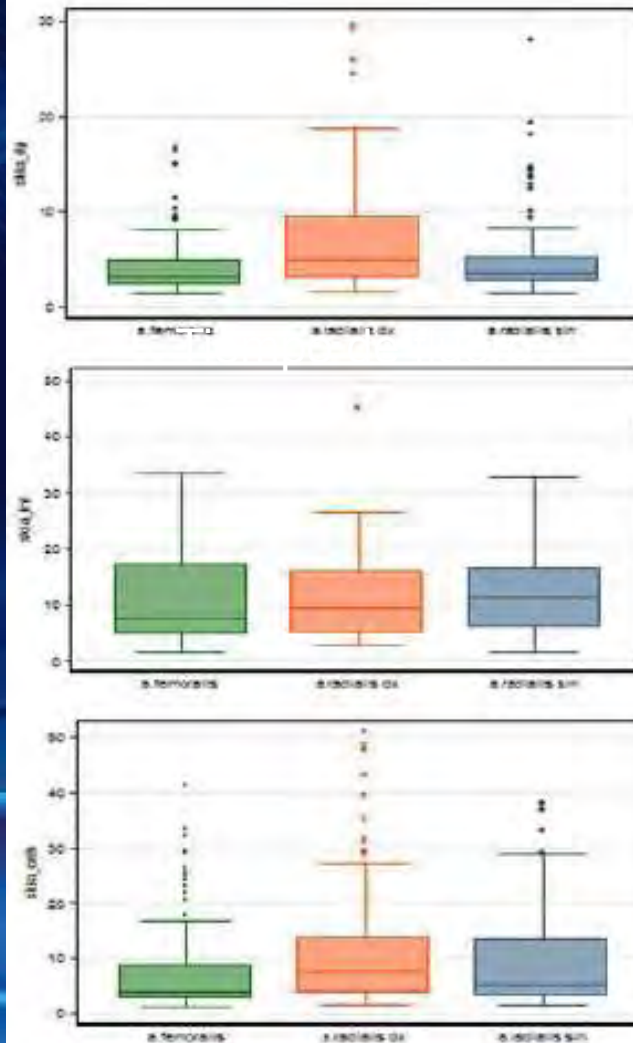
Left radial approach used as a method of choice since 2006



Diagnóstico

PCI

Total

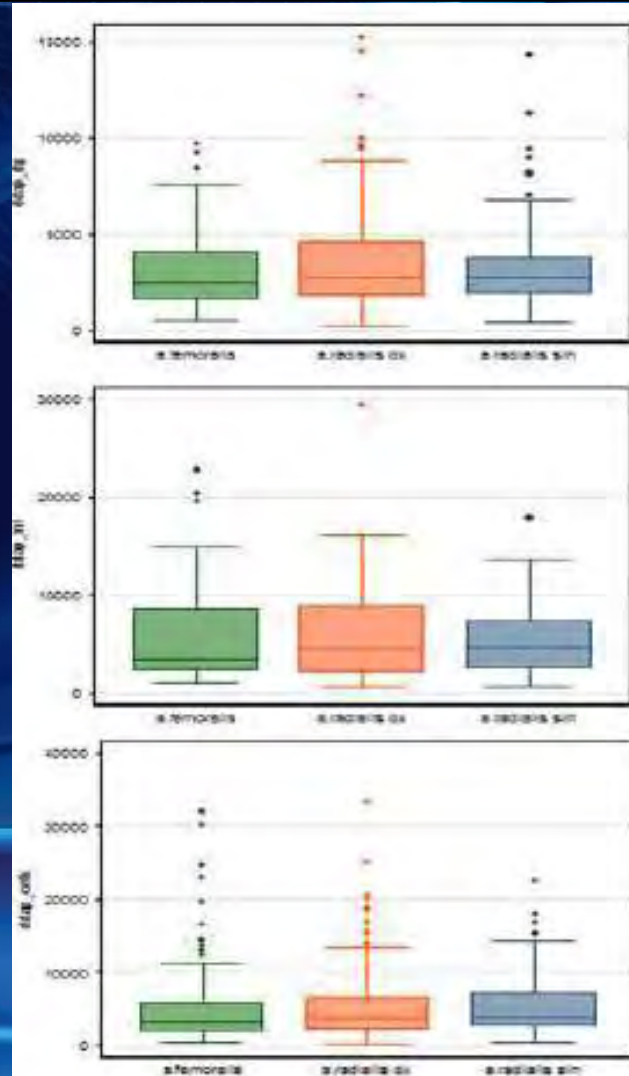


Tiempo de
fluoro

Diagnóstico

PCI

Total

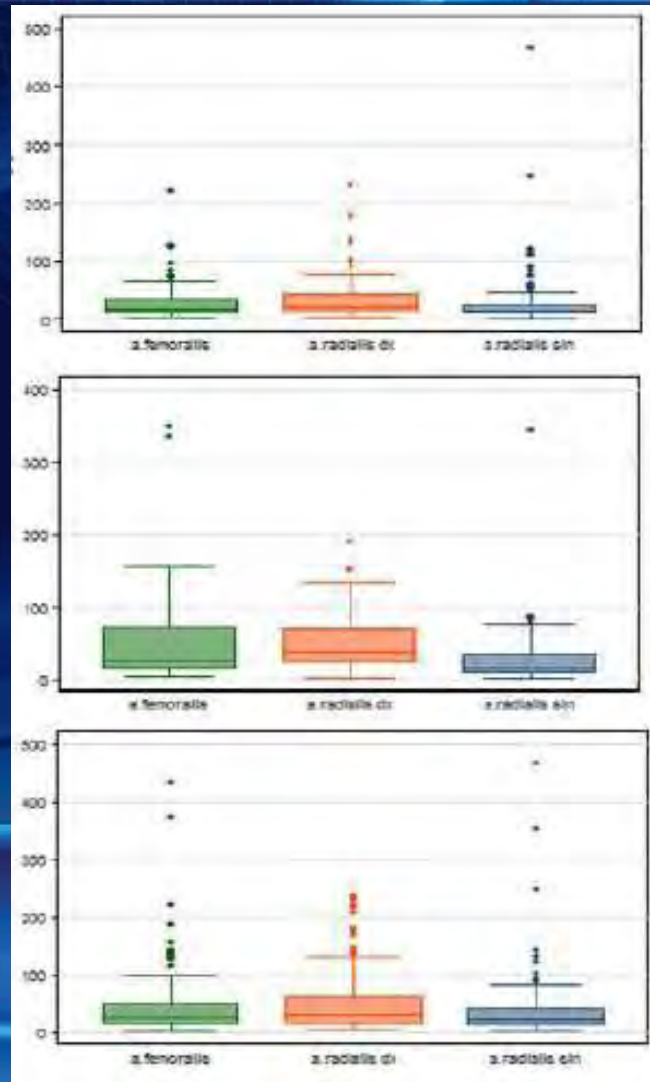


DAP

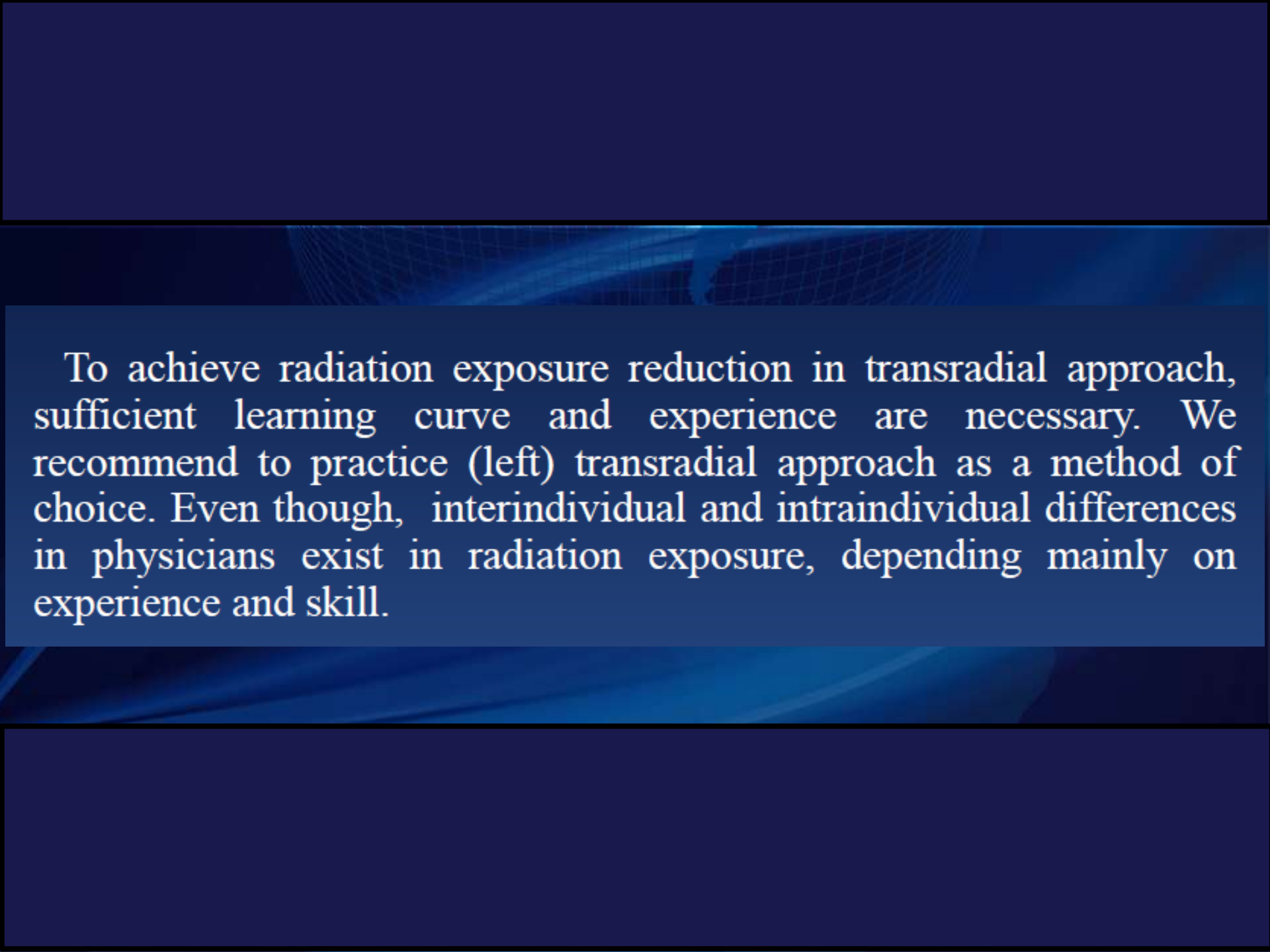
Diagnóstico

PCI

Total



Exposición
al operador



To achieve radiation exposure reduction in transradial approach, sufficient learning curve and experience are necessary. We recommend to practice (left) transradial approach as a method of choice. Even though, interindividual and intraindividual differences in physicians exist in radiation exposure, depending mainly on experience and skill.

CONCLUSIONES

- 1) La vía radial no irradia más (al operador) que la vía femoral al menos en centros/operadores de alto volumen.
- 2) Esto puede ser cierto para operadores con menos experiencia: luego de 30 años de carrera representa 3 años más de irradiación y 10% más de probabilidad de cáncer.
- 3) El tiempo de radioscopia no es una medida fiel de la dosis al paciente ni al operador. Registre DAP y Kerma-área.
- 4) La experiencia es el mejor antídoto para este problema.

RECOMENDACIONES

1) Utilice vía radial.

2) Radial izq.?:

Necesitamos más datos.

3) Después de la punción
trabajar con el brazo al
costado del cuerpo.



XXIII Jornadas SOLACI
9° Región Centroamérica y el Caribe
7 y 8 de Agosto de 2014



Sociedad Puertorriqueña de
CARDIOLOGÍA
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