IR Team Concept: “Changing times, Redefining roles”

Jafar Golzarian
Professor of radiology and Surgery
University of Minnesota
1896
• The first angiogram was performed only months after Roentgen's discovery.

• Two physicians injected chalk or mercury salts into an amputated hand and created an image of the arteries.

Post-mortem injection of mercury compounds, January 1896
• Mihran Kassabian wrote:

I have studied the blood vessels of infants and adults by
injecting them a substance opaque to the x-rays. The
substance used is a concentrated emulsion of bismuth
subnitrate, a strong solution of litharge or metallic
mercury.

In order to demonstrate sharply the arterial tree, the
injection must be done carefully and slowly.
Berberich J, Hirsh S
Die Roentgenradiographische Darstellung der Arterien und Venen am Lebenden
Muenchen Klin Wsch 2:2226-2228, 1923

Sicard JA, Forestier G
Injection intravasculaire d’huile iodée sous contrôle radiologique
CR Soc Biologie(Paris) 88:1200-1202, 1923
Brooks B

*Intra-arterial injection of sodium iodid*

*JAMA 82:1016-1019, 1924*
Dos Santos R, Lamas, Peirera-Caldes J
Arteriographia da aorta e dos vasos abdominalis
Med contemp 47:93-97, 1929
In 1929 in a small hospital in Eberswald Germany Werner Forssmann, a young surgical resident, anesthetized his own elbow, inserted a catheter in his antecubital vein and, catheter dangling from his arm, proceeded to a basement x-ray room where he documented the catheter's position in his right atrium — proving that a catheter could be inserted safely into a human heart.

Forssmann's goal was to find a safe way to inject drugs for cardiac resuscitation. He was determined that catheterization was the key, but it was believed at the time that any entry into the heart would be fatal. Forssmann was immediately fired for his self-experimentation, despite the significance of his discovery. The popular press acclaimed his work, but the medical establishment branded him as crazy, scorning him and ignoring his work for over a decade.
Forssmann

- He continued to experiment with catheterization in dogs and it is alleged that he stopped self-experimentation only when he had used all of his veins with 17 cut downs. Discouraged by his lack of acceptance in cardiology he switched to urology and eventually became a country doctor. He never returned to cardiology research but was awarded a Nobel Prize in 1956 (along with cardiology innovators Cournand and Richards) for his pioneering efforts.
Forssmann W

Die Sondierung des Rechten Herzens

Klin Wschr 8: 2085-2087, 1929
Rousthoi P

*Uber Angiokardiographie. Vorläufige Mittelung*

*Acta Radiologica 14:421-423, 1933*
Robb GP, Steinberg I

Visualisation of the chambers of the heart, the pulmonary circulation, and the great vessels in man

AJR 41:1-17, 1939
Farinas PL
A new technique for the arteriographic examination of the aorta and its branches
AJR 46:641-645, 1941
Radner S
Thoracal aortography by catheterisation from the radial artery
Acta Radiol 1948:178-180, 1948
Jonsson G
Visualisation of the coronary arteries
Acta radiol 29:536-540, 1948
Peirce EC
Percutaneous femoral artery catheterisation in man with special reference to aortography
Surg Gynec Obst 93:56-74, 1951
Seldinger SI

*Catheter replacement of the needle in percutaneous angiography: A new technique.*

*Acta radiologica 39: 369-376, 1953*
Dotter CT, Friesche LH

Visualisation of the coronary circulation by occlusion arteriography

Radiology 71:502-523, 1958
Amplatz K

Technique of Coronary angiography

Circulation 27-1:101-107, 1963
Fig. 14. To place the Amplatz ureteral stent, a guide wire was placed into the bladder percutaneously through a needle (A), the stent was advanced over the guide wire with the stent introducer (B), the guide wire was withdrawn (C, D), the introducer was withdrawn (E), and the double-J stent was in place (F).
• Special wire guides: stiff Amplatz wire guide
• Vena Cava filter
• Nitinol coil stent
• Clot lysers
• PTA mechanics
Paulin S

Coronary angiography. A technical, anatomic and clinical study

Acta Radiologica suppl 233:1-215, 1964
Odman P
Percutaneous selective angiography of the coeliac artery
Acta Radiol suppl 159 1958

Boysen E, Eckman CA, Olin T
Coeliac and Superior mesenteric arteriography in portal hypertonention.
Judkins M
Selective coronary angiography
Radiology 89;,:815-824, 1967
Charles Dotter
1920-1985
« ...it should be evident that the vascular catheter can be more than a tool for passive means for diagnostic observations: used with imagination it can become an important surgical instrument. »

*Charles T. Dotter 1963*
Dotter CT, Judkins ML
Transluminal treatment of arterioslerotic obstructions
Circulation 30:654-670, 1964
Balloons

Stent
January 16, 1964: First PTA

March 9, 1964

VISUALIZE BUT DO NOT TRY TO FIX,

and the turf battle began!
Muller R, Zeitler E.

*Experience with Dotter's catheter recanalization.*


Schoop W, Martin M, Zeitler E.

*The removal of old arterial occlusions by intravenous infusion of streptokinase.*

Gruntzig A, Hopff H
Perkutane Rekanalisation chronischer arterieller Verschlüsse mit einem neuen Dilatations-Katheter.
Deutch Med Wschr 99: 2502-2504, 1974
PTCA
First dog
October 22, 1975
First PTCA 1977

Am Heart J 103:779, 1982
Gianturco C, Anderson JH, Wallace S
Mechanical devices for arterial occlusion
AJR 124:428-435, 1975
Coils,
Filtrers
Stents
...
Palmaz JC, Richter GM, Noldge G, Kauffmann GW, Wenz W

Intraluminal Palmaz stent implantation. The first clinical case report on a balloon-expanded vascular prosthesis.

Radiologe 1987 Dec;27(12):560-3

Self-expanding endovascular prosthesis: an experimental study.

Radiology 1987 Sep;164(3):709-14
Introducers, Catheters and Balloons

1981 9 F
1984 8 F
1987 7 F
1991 6 F .070
1999 6 F 5 F

And Microcatheters
Dark rooms and Puck film changer
Imaging

- From non digital to DSA
- MRA and CTA
- From film to filmless
Evolution

• It took almost 80 years to get to the first stent and first Digital subtraction angiography (DSA)
• Additional 15 years to get to filmless Radiology and PACS
• In the last 10 years, there has been more inventions and evolution in Tools of trades both in imaging and IR than the last century
Tools

• CTA, MRA, CONE BEAM, Combined CT/MR and angio suites, Hybrides.....
• Microspheres
• Drug loading balloon, stents and microspheres
• Liquid embolic agents
• Resorbable materials
• Smaller and fancier thrombectomy, Atherectomy, laser, other ablation devices
• Etc.....
Procedures

• 20-30 years ago:
  • Mostly major arterial works and a few other stuff

• Then came:
  • TIPS
  • UFE
  • Vein Ablation
  • Tumor Ablation
  • Y 90
  • PAE
  • Many many more procedures
TEAM

• How all of these changes in evolution of IR and other factors such as new providers, Turf, etc will affect IR Team and members?
Team Members

• At the beginning
  • IR MD
  • IR Techs and/or nurses
  • Trainees
Team Members now

- MDs (IR and .......)  
- Techs  
- Nurses, NPAs, Coordinators, CNS  
- PAs  
- RPAs  
- Scheduler (s)  
- Transport  
- Admin  
- Trainees  
- And many more
if my fellow angiographers prove unwilling or unable to accept or secure for their patients the clinical responsibilities attendant on transluminal angioplasty, they will become high-priced plumbers facing forfeiture of territorial based solely on imaging equipment other can obtain and skills still other can learn”

Charles T Dotter 1968
IR MD

• Back then:
  • IR MDs where the lone wolf
  • Sitting in their chair waiting for patients

• With the improvement of technology and paradigm shift came TURF
• New procedures and great development
  • BUT not followed by Evidence
  • No clinical follow up
IR

• There is no debate on the fact that if IR is not changing to a clinical practice, it will die.
• We should move from treating a problem toward healing a condition and be recognized for it
  • Innovation alone is not enough
  • Research and evidence is essential
  • Immediate outcome is important but ....
    • Who cares and how to measure???
IR Team

- Not different from all other surgical units, the outcome of interventions are not only due to physician skill and experience

- But above and overall the outcome is related to the quality of **pre, per and post** procedure team members (and by the way the majority are not MDs)
IR Team

- ALL IR TEAM MEMBER work and commitment matter and affect patient QOL

- You save lives
  - You know it but you need to believe on it
Examples

• Pre:
  • From clinic to the pre-procedure area
    • -Karen (Journey to transplant)

• Procedure:
  • From the first contact to the transfer out of the room
  • Speed
    • Mike (Cone beam CT)

• Post
  • From immediate post procedure to follow-up
    • Mary (abdominal pain post TACE)
    • Sharon (UFE expulsion)
Other IR Providers

• A great addition to the team
• New perspective and greater opportunity to improve our patient care
• Very new and needs to pass the test of time
• Immediate issues:
  • Very disperse and vague job description
  • Still under a general name that goes from general practice to neurosurgery dealing with all aspects of medicine
Other IR Providers

• Future may move toward specialization of PA, NPA, CNS as we have seen in the rest of medicine and Radiology
• Specific curriculum and recognition
• Better job description
• More involvement with research and data generation
• Role in teaching residents and future providers
• How to interact with the new multidisciplinary IR team and docs
IR Nurse

- Mostly experience nurses (ICU,..)
- Sedation
- Very computer savvy
- Often the first point of contact with the patient and referring physicians through clinic and/or preprocedural area
  - Patient-team relationship and confidence
- Serving as a liaison between the patient and the nursing staff
IR Nurse

• Attending patient consultations
• Performing initial examinations and patient assessments
• Writing pre-procedure orders
• Performing daily rounds and communicating patient progress to the medical staff and the radiologist
• Orchestrating patient discharge and making additional referrals for home care
• Sterility and infection control
• Patient follow up
IR Nurse

• Issues:
  • Training curriculum not much oriented toward IR and Radiology
  • Great knowledge of medicine but not much knowledge of the IR procedures in general
  • Usually not interested to know about the tools and imaging
IR Nurse

- Mock Code
- Connection of IR to the rest of the hospital
  - Hospital committees
  - Liaison to other units
- Guidelines
- Joint commission
- Patients prospectus
- Safety
- Role in teaching residents and future providers
IR Tech

• Back then:
  • Many radiology technical works
  • Positioning, Filming (dark rooms)
  • No room for mistake
  • Knowledge of materials
  • Assisting
  • Scheduling
IR Tech

• Usually the most experience radiology techs
• Most experience with IR procedures and materials
• Extremely practical and to the point
• Creative
• Good understanding of procedures and steps
• Expertise in minimizing radiation exposure to the patient, self, and other members of the healthcare team
IR Tech

• Then came the computers, DSA, Digital imaging and PACS
• Significant increase in the new materials, techniques and procedures
• New players in town
  • Crisis in the role of techs
IR Tech

• Choice between being the central piece connecting every providers and members of the team

• or a person who positions/preps the patients and hand the materials

• Don’t become a commodity
IR Tech

• Issues
  • Many technologists must cross-train in CT or interventional for department coverage
    • conduct examinations infrequently, which provides
    • less opportunity to become familiar with equipment, operation and technique
  • No standard training
  • Learning in the field
  • Lack of experience
  • Multitudes of materials and procedures needs long-term training
  • Computer skills
IR Tech

• Structured training is the most essential and immediate step
• Continuous education
• Familiarity with ALL materials
  • Inventory
• Mastering ALL of imaging (basics and advanced)
  • Cone Beam
  • Fusion imaging
  • Role in teaching residents and future providers
Team Definition

• A group of people with a **full set of complementary skills** required to complete a task or project
Team Members

- Operate high degree of interdependence
- Share authority and responsibility for self-management
- Are accountable for collective performance
- Work toward a common goal

- A team becomes more than just a collection of people when a strong sense of mutual commitment creates synergy, thus generating performance greater than the sum of performance of its individual members
IR Team

• We need to embrace the changes and adapt ourselves to the new working environment
• We are distinct but complementary and have to build on this
  • People who share the same goal and champion it
  • People with compassion and confidence
  • People who care
  • Patient-driven
  • Innovators
IR Team

• Should know our history and be proud of who we are
  • Pioneered minimally medicine
  • Change medical practice and WE ARE the future of medicine
  • IR harnesses image-guided therapies to develop breakthrough treatments and improve standard of care
• Evolution is changing IR and challenges us. However, I have no doubt that the future is even brighter for IR TEAM