

Almost Zero Dose to Operating People in Angiography System During Angiograms

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Abstract - As a Biomedical clinical engineer on ANGIOGRAPHY system we maintain and calibrated our system with the focus target of precise minimum dose to patient and operating team like attending physician, nurses and operators.

Key Words: Biomedical engineering, Angiography, low dose, Interventional, CATHLAB

1. INTRODUCTION

Angiograms are created by inserting a catheter into the aortic root, or into the individual left or right coronary artery ostia. Contrast is injected through the catheter, or a pig-tail, and imaged using fluoroscopy.

The image below show an angiogram created through a contrast injection left coronary artery.



Clinically angiograms can be used to visualize the coronary vasculature and determine if any occlusions or blockages are present. When the vasculature becomes obstructed interventions such as stenting or bypass can be performed.

Almost Zero dose to operator's team in ANGIOGRAPHY procedure is unique idea after changing working style and software improvement it has valuable achievement.

Idea comes in mind when a CT scan zero dose to radiologist, nurse and operators then why not in angiography.

1.1 Methods

It looks impossible currently but after few following changes it is possible.

- 1- We need to mentally prepare our team that it is possible and it takes bit extra time because not use to it, but this time reduce with time of perfect practices.
- 2- Changes in CATH room and control room layout specially designing new CATH Labs and also changes in existing CATH Lab according to below layout.
 - i- CATH room to control room easy access as shown in the attached drawing a door between CATH and control room figure 1 shows.

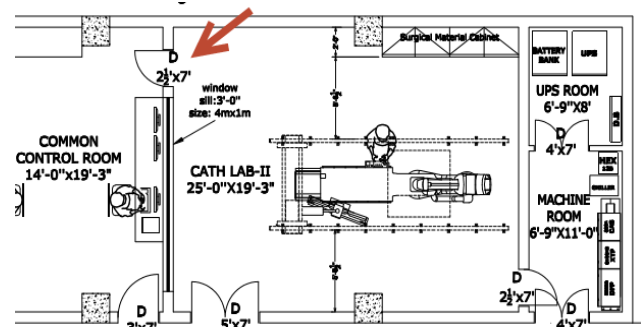


Fig -1: CATHROOM LAYOUT

- 3- Use wireless FLOURO and DA switches.
 - i- Easy access to control room FLOURO or DA switches near to the door and in front of lead glass.
 - ii- Satellite console for C ARM Positioning control from the control room.
- 4- Auto positioning function at Hyper Handel.
- 5- Stepping DSA function in the table.
- 6- Program to system auto Adjustment of Table and FPD from patient.
- 7- Test runs before acquisition and then ready.

2. Procedure

AA: After puncturing from the femoral or radial, catheter place on the left side of heart and use test FLOURO to check the catheter engaged with the left heart system. Then all teams come out to control room and using auto positioning function take angulation which already saved in position 11

to 19 for Dr. ABC and 21 to 29 for Dr. DEF same can use 5 to 7 physicians personal recommended positions. Once done all 11 to 16 following left side positioning.

- i- RAO 20 - Caudal 20
- ii- RAO Cranial
- iii- AP 0 - Caudal 30
- iv- LAO 50 - Caudal 30
- v- LAO 50 - Cranial 30
- vi- AP 0 - Cranial 40

DA switch synchronized with injector multiple injection mode like 10cc with 15 flow and 1000 PSI. So once pressing DA switch, contrast injected and stop DA after a set time like 5 secs in our case.

BB: Then go attending physician inside of CATH room again and engaged catheter with the right heart and done following Angulation from 17 to 19.

- i- RCA LAO
- ii- RCA RAO 30
- iii- AP 0 Cranial 30 View

CC: Same use of LV segments take exposure on following angulation.

- i- LAO view

2.1 Attitudinal Description of Anatomy:

(Figures 1A and 1B). In the anteroposterior viewing angle (CRA/CAU 0, LAO/RAO 0), right- and left-sided structures are found on the left and right sides of the screen, respectively.

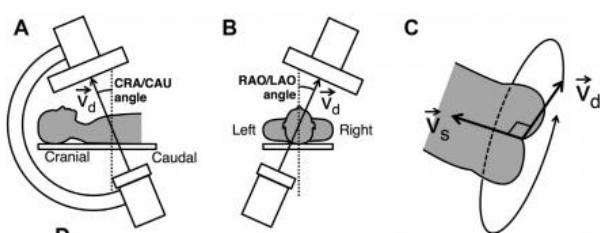
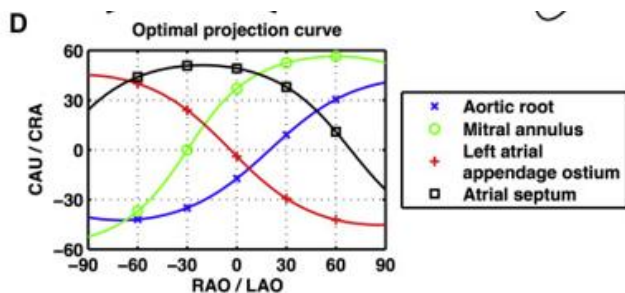


Table -1: Optimal projection curve



3. CONCLUSION

After completing the procedure, we found dose Air Karma 313 and Area Dose 2535 cgycm2 on patient but almost zero dose on ANGIO operating people

Discussion / limitation:

Our current system works perfectly after using several combinations, but in future we are working on this project with a more convenient way using adding one touch switch in console PC like adding the following:

- 1- Plan in acquisition all required angle positioning and C ARM rotate accordingly from the control room.
- 2- System interference warning and auto table and FPD adjustment.

Recommendations

Fact and figures regarding dose management and safety very important of long time radiation environment.

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BIOGRAPHIES



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Student of PHD Biomedical engineering. 20 years' work experience at Medequips as a Biomedical engineer and application specialist on Toshiba/Canon Angiography systems.