(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

ORIGINAL ARTICLE

Evaluation of origin of third coronary artery in human cadavers

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ABSTRACT:
Background: There are two coronary arteries, right and left. Sometimes supernumerary arteries may arise from the anterior aortic sinus. Commonest among them is the third coronary artery. The present study was conducted to study on the origin of third coronary artery in human cadavers. **Materials & Methods:** 56 formalin fixed human cadaveric hearts were collected from the department of Anatomy and Forensic Medicine.Specimens were collected as block dissection of the heart along with associated structures like ascending aorta, pulmonary trunk.The right, left and third coronary arteries were dissected meticulously. **Results:** Extent of third coronary artery was ends over right ventricular outflow tract (infundibulum) in 30 cases, extends up to middle of the anterior wall of right ventricle in 16, TCA larger than RCA extending up to inferior border of heart in 6 and TCA larger than RCA and ending by anastomosing with anterior interventricular branch of left coronary at apex of the heart in 4 cases. The difference was significant (P< 0.05). **Conclusion:** Third coronary artery takes part to perfuse apical and septal area by anastomosing with branches of left anterior descending artery.
Key words: third coronary artery, supernumerary arteries, right ventricle

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This article may be cited as: Khan AI, Khan IKS. Evaluation of origin of third coronary artery in human cadavers**.** J Adv Med Dent Scie Res 2016;4(6):401-403.

INTRODUCTION

There are two coronary arteries, right and left. Sometimes supernumerary arteries may arise from the anterior aortic sinus. Commonest among them is the third coronary artery.[1] A third coronary artery (TCA) has been defined as a direct branch from the anterior aortic sinus (Right coronary sinus) that contributes to the vascularization of the infundibulum (conus arteriosus) of the right ventricle.[2] Different terms are used in the literature for describing this coronary artery like supernumerary right coronary artery, infundibular artery, right Vieussens artery, Arteria accessoria, or adipose artery.[3]

The word 'coronary' (Latin word) means a crown like arrangement of all coronary arteries in atrioventricular sulcus of the heart. Right and left coronary arteries a vasavasorum of the ascending aorta supplies the heart.[4]The conus artery supplying the arterial conus is a branch of right coronary in 64% of cases is commonly subjected for variations. One such is it may arise by a separate opening in the anterior aortic sinus constituting the third coronary artery.[5]"Annulus of Vieussens" formed at the origin of pulmonary trunk is an anastomoses between third coronary artery and a similar branch of left coronary artery. Schlesinger described for the first time about third coronary artery which supplies the infundibulum of the right ventricle.[6] An arterial ring formed between third coronary artery and a branch of left anterior descending artery forms a collateral blood steam in coronary insufficiency. The standard approaches for coronary angiographies fail to visualise it in many cases.[7]The present study was conducted to Study on the origin of third coronary artery in human cadavers.

MATERIALS & METHODS

The present study comprised of 56 formalin fixed human cadaveric hearts, collected from the department of Anatomy and Forensic Medicine.

Specimens were collected as block dissection of the heart along with associated structures like ascending aorta, pulmonary trunk.Each specimen was thoroughly washed to remove blood clots and then tagged with a token having identification number and fixed in 10% formalin. Epicardium and fat was removed in piecemeal. The right, left and third coronary arteries were dissected meticulously. The ascending aorta was sectioned transversely approximately 1 cm above the commissure of aortic leaflets. Next the aorta was longitudinally opened at the level of right posterior aortic sinus to enable the visualisation and analysis of coronary ostia.Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

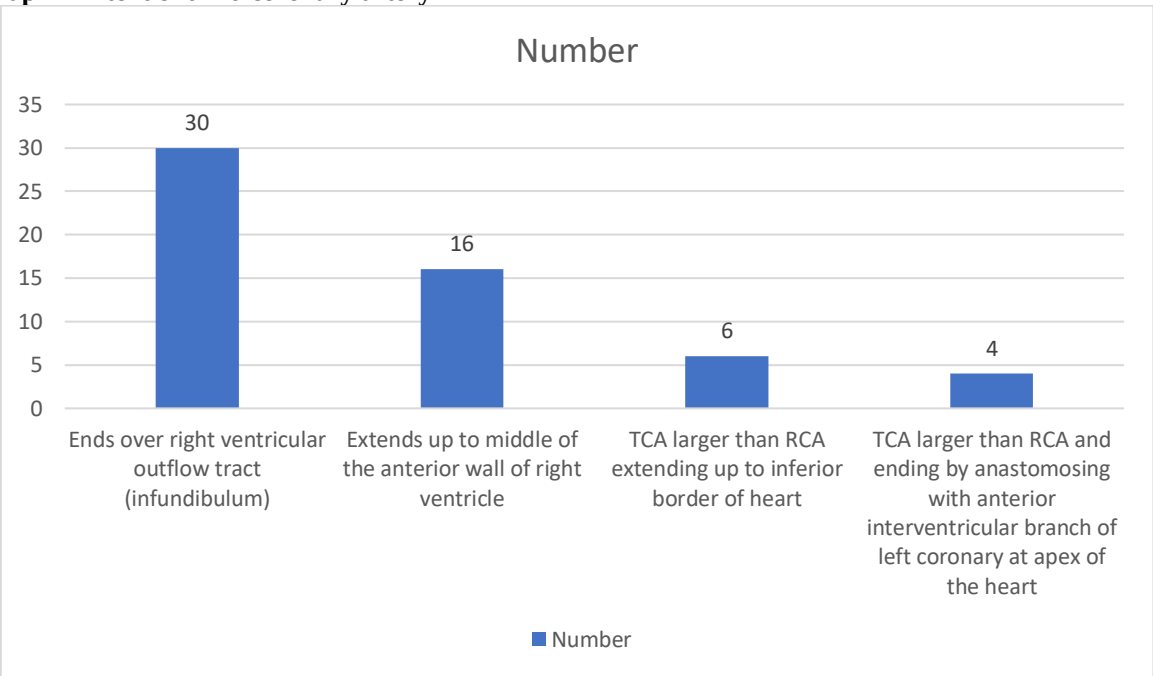
RESULTS

Table I Extent of third coronary artery

Extent	Number	P value
Ends over right ventricular outflow tract (infundibulum)	30	0.01
Extends up to middle of the anterior wall of right ventricle	16	
TCA larger than RCA extending up to inferior border of heart	6	
TCA larger than RCA and ending by anastomosing with anterior interventricular branch of left coronary at apex of the heart	4	

Table I shows thatextent of third coronary arterywas ends over right ventricular outflow tract (infundibulum) in 30 cases, extends up to middle of the anterior wall of right ventricle in 16, TCA larger than RCA extending up to inferior border of heart in 6 and TCA larger than RCA and ending by anastomosing with anterior interventricular branch of left coronary at apex of the heart in 4 cases. The difference was significant (P< 0.05).

Graph I Extent of third coronary artery



DISCUSSION

The TCA often anastomoses with the branch of the left anterior descending branch (LADA) and forms Vieussens' arterial ring.[8] This ring represents a significant path of collateral blood stream under conditions of coronary insufficiency. These branches do open up in some cardiac pathology to provide collateral perfusion.[9] They have been shown to improve with age. The incidence of TCA is quiet common but standard approaches for coronary angiographies fail to visualize the TCA in many cases.[9]The present study was conducted to Study on the origin of third coronary artery in human cadavers.

We found that extent of third coronary artery was ends over right ventricular outflow tract (infundibulum) in 30 cases, extends up to middle of the anterior wall of right ventricle in 16, TCA larger than RCA extending up to inferior border of heart in 6 and TCA larger than RCA and ending by anastomosing with anterior interventricular branch of left coronary at apex of the heart in 4 cases.Dhobale et al[10]evaluated the gross anatomy of third coronary artery in terms of their number, origin, extent and distribution.After an ethical approval, 150 formalin fixed adult human cadaveric hearts were collected from Department of Anatomy, BVDU Medical College and Hospital, Sangli and Pune over the period of six years. The careful dissection was carried out to note details about third coronary artery and data was analysed.The TCA was present in 32% of the heart specimens. In 42 hearts (28%) single TCA and in 6 hearts (4%) double TCA were noted. It was found to be variably distributed to conus arteriosus, anterior wall of the right ventricle, interventricular septum and the apex of the heart. TCA was larger than right coronary artery in 8 hearts and later ended at inferior border of heart. Myocardial bridge was noted over large third coronary artery in one specimen.

Jyothi et al[11] studied if the origin of third coronary artery is from a separate orifice or a branch of right coronary artery as right conus artery.After an ethical approval, 49 formalin fixed human cadaveric hearts were collected from department of Anatomy and Forensic medicine, Mysore Medical College and Research Institute, Mysore, India and a study was

done on the origin of third coronary artery in human cadavers by dissection method.It was observed that the incidence of third coronary artery was 10.2%.Uflacker[12] described a small branch may arise directly from right coronary sinus in an isolated ostium supplying the right ventricle infundibulum called as the third coronary artery. Joshi SD et al described the difficulties faced by radiologist to interpret images and cardiac surgeons during procedures like angiography, angioplasty and coronary artery bypass grafting in the presence of multiple ostia. Kaur D et al[13] found that out of 77 heart specimens minute accessory coronary ostia for third coronary artery was observed in anterior aortic sinus in 12 specimens(15%).

CONCLUSION

Authors found that third coronary artery takes part to perfuse apical and septal area by anastomosing with branches of left anterior descending artery.

REFERENCES

1. Olabu BO, Saidi HS, Hassanali J, Ogeng'o JA. Prevalence and distribution of the third coronary artery in Kenyans. Int J Morphol 2007;25(4):851-4.
2. Tanigawa J, Petrou M, Di Mario C. Selective injection of the conus branch should always be attempted if no collateral filling visualises a chronically occluded left anterior descending coronary artery. Int J Cardiol 2007;115(126):126-27.
3. Sirikonda P, Sreelatha S. Measurements and location of coronary ostia. Int J Biol Med Res 2012;3(4):2489-96.
4. Bharambe VK, Arole VA. Study of variations in coronary ostia. J Anat Soc India 2012;61(2):221-8.
5. Kalpana R. A study on principal branches of coronary arteries in humans. J Anat Soc India 2003;52(2):137-40.
6. Lujinovic A, Ovcina F, Tursic A. Third coronary artery. Bosnian Journal of Basic Medical Sciences 2008;8(3):226-9.
7. Stankovic I, Jesic M. Morphometric characteristics of the conal coronary artery. MJM 2004;8:2-6.
8. Edwards BS, Edwards WD, Edwards JE. Aortic origin of conus coronary artery: Evidence of postnatal coronary development. Br Heart J 1981;45:555-8.
9. Dhobale MR, Puranik MG, Mudiraj NR, Joshi UU. Study of third coronary artery in adult human cadaveric hearts. Journal of Clinical and Diagnostic Research: JCDR. 2015 Oct;9(10):AC01.
10. Jyothi SR, Dakshayani KR. Study on the origin of third coronary artery in human cadavers and its clinical significance. Indian Journal of Clinical Anatomy and Physiology. 2017 Jul;4(3):308-11.
11. Uflacker R. Atlas of Vascular Anatomy An angiographic approach. Baltimore: Williams and Wilkins; 1997. pp. 280-1.
12. Joshi SD, Joshi SS, Athavali SA. Origins of the coronary arteries and their significance. Clinics 2010;65(1):79-84.
13. Kaur D, Singh K, Nair N, Singh Kalra A. Morphology and Morphometry of coronary ostia in South Indian Adult human cadaveric hearts. Int J Biol Med Res 2012;3(3):2169-71.