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RESEARCH ARTICLE

ANATOMICAL STUDY OF CORONARY ARTERIES AND ITS BRANCHING PATTERN IN COASTAL ANDHRA PRADESH POPULATION

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Abstract

Aim: The aim of this anatomical study of coronary arteries and its branching pattern in costal andhra pradesh population is to assess risk factors for occurrence of CAD's.

Methods: Conventional Dissection method.

Results: Coronary artery disease (CAD) is a major cause of death and disability in developed countries, and incidence of CAD is increasing annually in the underdeveloped world. Today, percutaneous coronary intervention plays a major role both in diagnosis and treatment of CAD. This present study was done to assess the normal patterns of coronary arteries with reference to its origin, branching pattern, caliber, predominance, variations and anomalies. 100 adult male and female cadaveric and fresh hearts preserved with 10% formalin were obtained from the Department of Anatomy & Department of forensic, Rangaraya Medical College, Kakinada, Andhra Pradesh. The origins, various branching patterns and diameter of right and left coronary arteries were observed. Both RCA & LCA was originating from the anterior aortic sinus in 100% and LCA from left posterior aortic sinus in 100. In the present study, termination of RCA occurs between acute margin and crux of heart in 8% of specimens, at PIVA posterior Interventricular artery or crux of heart in 12% of specimens, in between crux and obtuse margin of the heart in 76% of specimens, at the obtuse margin of the heart in 4% of specimens. The main trunk of LCA divides into two branches (bifurcation) in 76% of specimens, into three branches (trifurcation) in 20% of specimens, into four branches (quadrifurcation) in 2% of specimen, into five (pentafurcation) branches in 2% of specimen. The minimum diameter of RCA was 2.5 mm. The maximum diameter o f R C A was 3.9mm. The minimum diameter of LCA was 2.6 mm the maximum LCA diameter was 6.2 mm. In 100 specimens the posterior interventricular artery arose from the right coronary artery indicating right dominance in 90 specimens and in 10 specimens from the left circumflex coronary artery indicating left dominance. Right dominance was present in 90%, left dominance in 10% and co-dominance was nil. Variations in branching pattern of

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coronary arteries as reported in present study necessitate its importance for proper diagnosis and management of coronary artery disease.
Conclusion: Arterial pattern and its variations are important to prevent false interpretation of the arterial angiograms in management of coronary artery diseases.

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Introduction:-

Coronary artery disease (CAD) is a major cause of death and disability in developed countries, and incidence of CAD is increasing annually in the underdeveloped world. Today, percutaneous coronary intervention plays a major role both in diagnosis and treatment of CAD. Heart receives its blood supply from the coronary vessels. The word coronary is derived from the Latin word co-ro-ne, Greek ko ro ne, means anything hooked or curved and coronary means encircling in a manner of "crown".[1] that is both arteries form an oblique inverted crown within the atrioventricular groove.

Arterial supply to heart is achieved by two arteries from ascending aorta. The right coronary artery arises from the right coronary sinus and the left coronary artery arises from the left posterior aortic sinus of the ascending aorta.[2] Ostia of the coronary arteries are located in the center of the corresponding aortic sinuses. Malformations of the position of the ostia and origin of coronary arteries lead to high risk of sudden death.[3] Heart supplies the blood to whole body during systole but it is supplied by the coronary arteries during diastole. Vascular anomalies pose a great challenge to anatomists and Cardio-Thoracic surgeons. Knowledge of normal coronary anatomy and its variations or anomalies is essential in heart surgeries. Failure in detection of these anomalies leads to complications.[4] Holsted, The coronary arteries, studied for many years to determine the pathophysiology of coronary disease, have been under intense scrutiny by those attempting to revascularize areas of ischemic myocardium using grafts to bypass arteries that have become obstructed by atheroma.[5] Knowledge of normal and variant anatomy and anomalies of coronary circulation is an increasingly vital component in the management of congenital and acquired heart diseases.[6] Major or minor congenital anomalies of the coronary arteries are present in those undergoing cardiac catheterization. Depending upon the origin, course, and termination of the anomalous vessel, certain coronary anomalies may be associated with sudden death, syncope, other congenital heart diseases, or angina syndromes, or they may be incidental findings, without adverse prognosis.[7] The term „dominant" is used to refer to the coronary artery giving off the posterior interventricular (posterior descending or inferior interventricular) branch, which supplies the posterior (inferior) part of the ventricular septum and wall of the left ventricle. The right artery is the dominant artery in 60% of hearts (Henry gray 2015) [8]. In left dominance, the posterior interventricular artery is a branch of the circumflex branch of the left coronary artery (10%) (Richard.S.Snell 2012) [9]. A short left main coronary artery < 8 mm length is associated with left coronary dominance. About 20% of human hearts exhibit shared coronary dominance such as both the right and circumflex arteries provide posterior descending artery AV nodal artery arises from the dominant coronary artery, AV Bundle of His receives a dual blood supply from the AV nodal artery and first septal perforator of the left anterior descending artery(Moss and Adams 2017) [10].

The right coronary artery arises from anterior aortic sinus, runs forward between the pulmonary trunk and the right auricle. (Richard.S.Snell 2012) [9] Near its origin, the RCA gives off an ascending sino-atrial nodal branch. Then it descends in coronary sulcus and gives off the right marginal branch, as it runs to apex of heart. Then it turns to left and continues in coronary sulcus to posterior aspect of the heart. At the crux (L.cross) of heart, gives rise to the posterior interventricular artery (PIV, PIA, or PIVA), most often called the posterior descending artery (PDA) and atrioventricular nodal branch. Posterior interventricular artery passes along the interventricular groove and reach the apex of the heart. Right coronary artery then anastomoses with the left coronary artery. Posterior descending artery gives raise to septal branches that helps us in identifying this branch from posterolateral segment of right coronary artery.

The left coronary artery arises from left posterior aortic sinus passes between the left auricle and the left side of the pulmonary trunk, and runs in the coronary sulcus. The LCA divides into two branches as left anterior descending artery and the circumflex branch. The left anterior descending artery passes along the interventricular groove to the apex of the heart. Here it turns around the inferior border of heart and anastomoses with the posterior Interventricular branch of RCA. The smaller circumflex branch of the LCA follows the coronary sulcus around the left border of the heart to the posterior surface of heart. The left marginal branch of

circumflex branch follows the left margin of the heart and supplies to left ventricle. Most commonly, the circumflex branch of the LCA terminates at coronary sulcus on the posterior aspect of the heart before reaching the crux of the heart.

Aim:
The aim of this anatomical study of coronary arteries and its braching pattern in costal andhra pradesh is to assess risk factors for occurrence of CAD's.

Under the following parameter:
Origin of the RCA & LCA
1. Length of the RCA & LCA
2. Course of the RCA & LCA
3. Branching pattern of main LCA
1. Bifurcation
2. Trifurcation
3. Quadrifircation
4. Pentafurcation

Branching pattern of RCA [i.e.] termination at the level of
1. Between Acute margin and crux of the heart
2. At posterior interventricular septum
3. Between crux and obtuse margin of heart
4. At the obtuse margin of heart
5. Coronary dominance
6. Diameter of RCA & LCA

Materials and Methods:-

Materials:-

Scalpel, Forceps tooth forceps & Non - toothed forceps Scissors, Vernier caliper, Scale and Thread

Methods:-

Dissection Method:-

Conventional Dissection method. In this present study 100 human hearts collected with portion of ascending aorta from relatively fresh bodies & cadavers from Forensic Department and Department of Anatomy, Rangaraya Medical College Kakinada. The hearts were labeled from 1-100. The Right Coronary Artery was located in the coronary sulcus. Right Coronary Artery was followed from its origin to termination. Then trace the left coronary artery to the coronary ostium (left posterior) of the aorta. Scrap the fat in the anterior interventricular groove to expose the left anterior descending branch of left coronary and trace the artery to the diaphragmatic surface. Then trace the distal part of the left coronary artery which continues as circumflex branch of left coronary artery. The branching pattern of both the arteries along with any variation were observed and noted down and photographed. The ethical committee clearance was taken from the Rangaraya Medical College Ethical Committee, Kakinada for the present study.

Observations:-

The origin of both the coronary arteries arising from single ostia was observed in all 100 specimens. The origin of right coronary artery in the study was seen in anterior aortic sinus in all hundred specimens. The origin of left coronary artery in the study was seen in left posterior aortic sinus in all hundred specimens. No variations were noted in the present study. The length of RCA was measured from the origin of the RCA to the termination and its Posterior interventricular artery or the posterior descending artery (PDA) with the help of a thread and by vernier calipers. In the present study, length of main trunk of RCA in8 specimens was 9-10 cms, 72 specimens ranged between 10.1-11 cms, 8 specimens ranged between 11.1-12cms, 12 specimens ranged between 12.1-13 cms (Table-1 and Fig-1). The mean of these values was 10.75 cms with a range in betweenfrom 9.2 cms to 12.7 cms. The maximum length RCA was 12.7 cms the minimum length was 9.2 cms. The maximum length of PDA was 5.8cm the minimum length was 3.5cms.

Length of right coronary artery in cms	Frequency	Percentage
9-10 cms	8	8%
10.1-11	72	72%
11.1-12	8	8%
12.1-13	12	12%

Table-1:- Length of right coronary artery in cms.

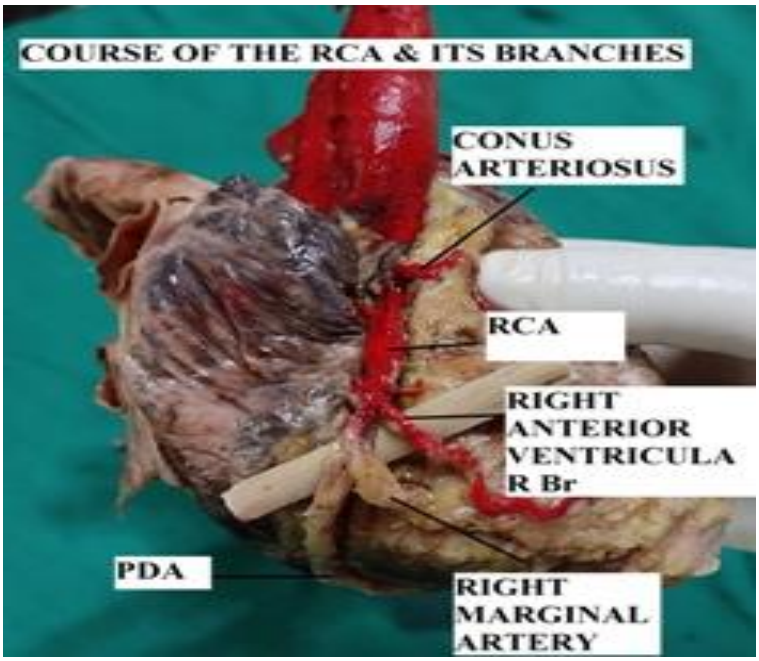

Fig 1:- Course of Right Coronary Artery.

Fig 2:- LCA main trunk length measuring with Vernier calipers.

Length of main trunk of left coronary artery in mms	Frequency	Percentage
<9.5	16	16%
9.6-9.9	14	14%
10-10.1	16	16%
10.2-10.3	36	36%
10.4-10.6	16	16%
25	2	2%

Table-2:- Length of main trunk of left coronary artery in mms.

After arising from left posterior aortic sinus, the left coronary artery runs forwards between the pulmonary trunk and the left auricle, and then it runs in the left atrioventricular groove in all hundred specimens. No variations were observed. The length of main trunk of LCA was measured from the origin to the point of division of main trunk into its branches. In the present study length of LCMT in 16 specimens was less than 9.5mm, 14 specimens ranged between 9.6 - 9.9mm, 16 specimens ranged between10 -10.1mm, 36 specimens ranged between 10.2-10.3 mm, 16 specimens rangedbetween 10.4-10.6 mm, 2 specimen in the range between 10.6 -25 mm (Table-2 and Fig-2). Maximum length was 25 mm, the minimum length was 3 mm. The main branches of LCA were left anterior descending (LAD), left circumflex (LCX), diagonal, left marginal branches were also noted in the present study. In the present study LAD terminated anterior to the apex, crossed the apex and traversed the PIVS and meets the PIVA or PDA of RCA. The LAD is range between 110 – 150 mm. In the present study LCX was measured in the range between 55 to 90mm (Fig – 3)

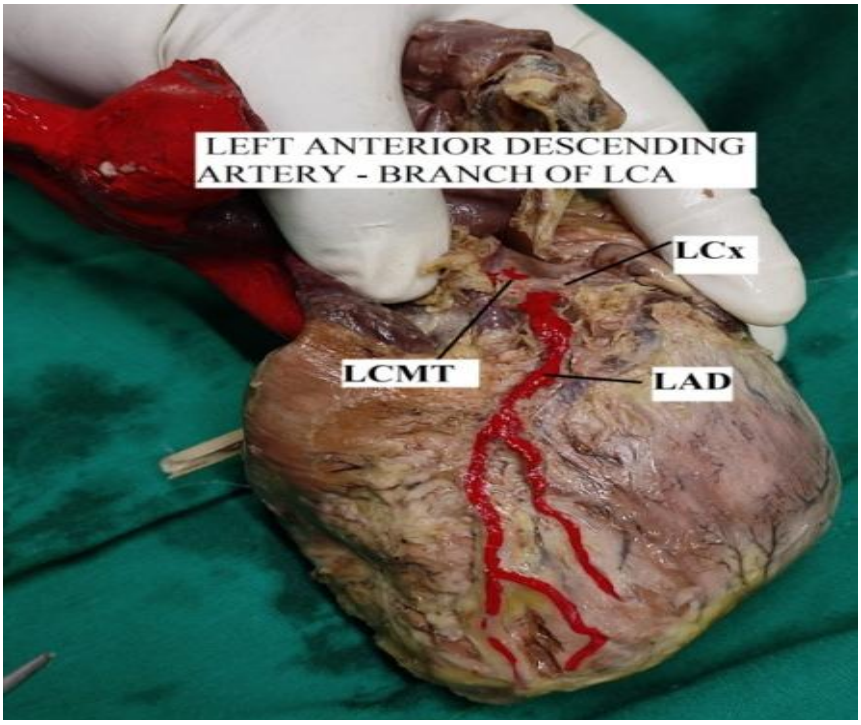

Fig 3:- Course of LAD br of LCA.

Fig 4:- Measuring length of RCA.

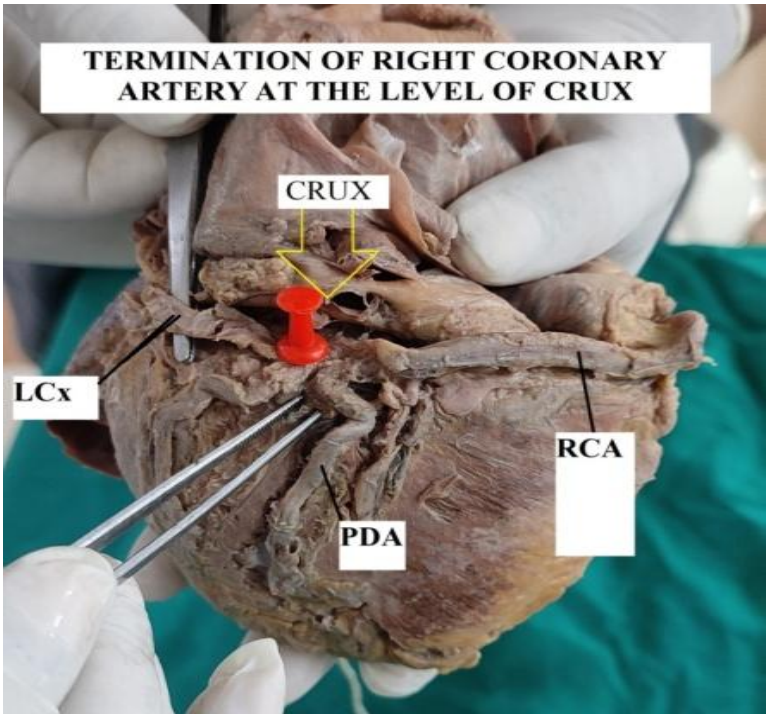

Fig 5:- Termination of RCA- CRUX.

Course of the RCA passes at first anteriorly o n r eaching the atrioventricular groove, it descends almost vertically to the right (acute) cardiac border, curving around it into the posterior (inferior) part of the groove, where both interatrial and interventricular grooves meet at a point, the appropriately termed called cardiac crux. The artery ends a little to the right or left of the crux, often by anastomosing with the circumflex branch of the left coronary artery in 98 specimens. In two specimens variations were observed.

In the present study, termination of RCA occurs between acute margin and crux of heart in 8 specimens, at posterior Interventricular artery or crux of heart in 12 specimens, in between crux and obtuse margin of the heart in 7 6 specimens, at the obtuse margin ofthe heart in 4 specimens (Fig- 4, 5).

The LCA after arising from the origin it divides into two branches (bifurcation) or three (trifurcation) branches, four (quadrifurcation) or five (pentafurcation) branches. The main trunk is followed in the anterior interventricular groove to find the number of branches. The LCMT divides into two branches (bifurcation) in 76 specimens, into three branches (trifurcation) in 20 specimens, into four branches (quadrifurcation) in 2 specimens, into five (pentafurcation) branches in 2 specimens. (Table-3) & (Fig- 6, 7, 8, 9). The artery that gives rise to the posterior Interventricular branch determines the coronary Dominance. It may arise either from the LCA or RCA resulting in left or right dominant heart. So the origin of the posterior interventricular artery is searched to classify the heart dominance (Table-4 and Fig-12, 13, 14). In 88 specimens the PIVD or PDA arose from the RCA indicating right dominance and in 10 specimens from the LCx indicating left dominance. And in 2 specimens the PDA was arose from both origins of RCA and LCx branch of LCA.

Branching Pattern of left coronary artery	Frequency	Percentage
Bifurcation	76	76
Trifurcation	20	20
Quadrification	2	2
Pentafurcation	2	2

Table-3:- Branching Pattern of Left Coronary Artery.

In the present study, diameter of RCA at the originwas measured by using the vernier cali pers. And in between 2.5 -3.0 mm in 20 specimens, in between 3.1 to 3.4 mm in 68 specimens and inbetween 3.5-3.9 mm in12 specimens (Table-5 and Fig-15). The minimum diameter was 2.5 mm. The maximum diameter was 3.9 mm.

In the present study, diameter of LCA at the origin was measured using vernier calipers. It was found to be in between 2.6 - 3 mm in 8 specimens, in between 3.1 to 4 mm in 16 specimens, in between 4.1-5 mm in 64 specimens, in between 5.1-6 mm in 8 specimens, in between 6.1-6.2 mm in 4 specimens (Table-5 and Fig-16). The minimum diameter was 2.6 mm,The maximum diameter was 6.2 mm.

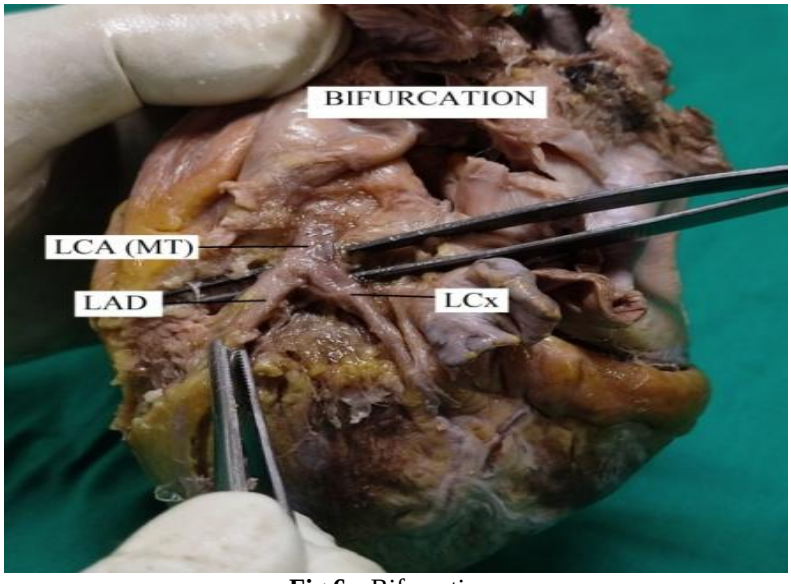

Fig 6:- Bifurcation.

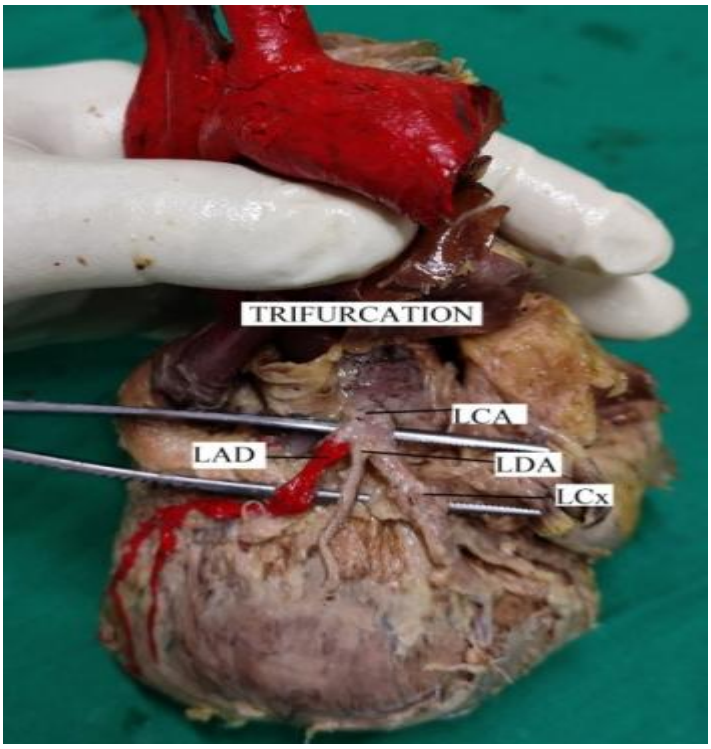

Fig 7:- Trifurcation.

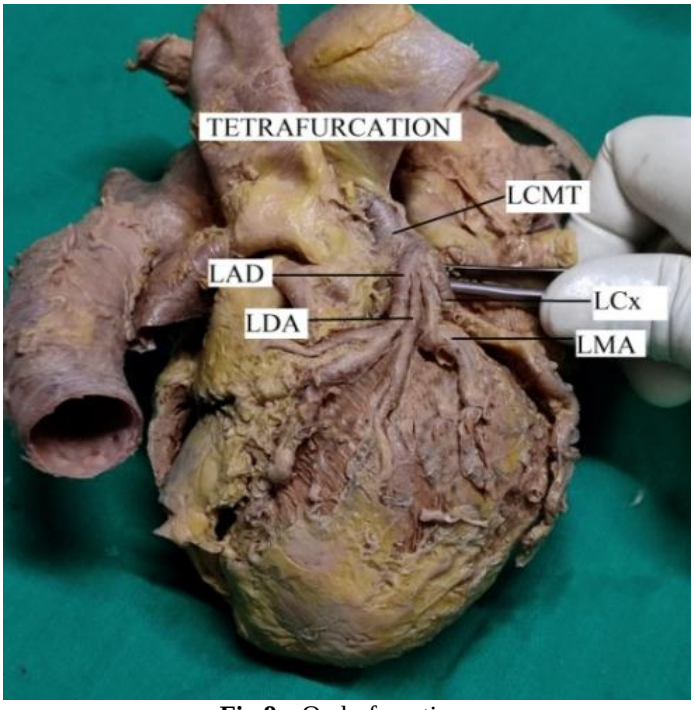

Fig 8:- Qudrafurcation.

Table-4: Dominant artery

Dominant artery	Frequency	Percentage
Right Dominance	88	90

Left Dominance	10	10
Balanced or Co-Dominance	2	2
Total	100	100

Table 5:- Diameter of RCA & LCA.

Diameter Of RCA	Frequency	Percentage	Diameter Of LCA	Frequency	Percentage
2.5-3mm	20	20	**2.3- 3**	8	8
3.1-3.4 mm	68	68	**3.1 - 4**	16	16
3.5-3.9 mm	12	12	**4.1 - 5**	64	64
			5.1 - 6	8	8
			6.1 – 7	4	4

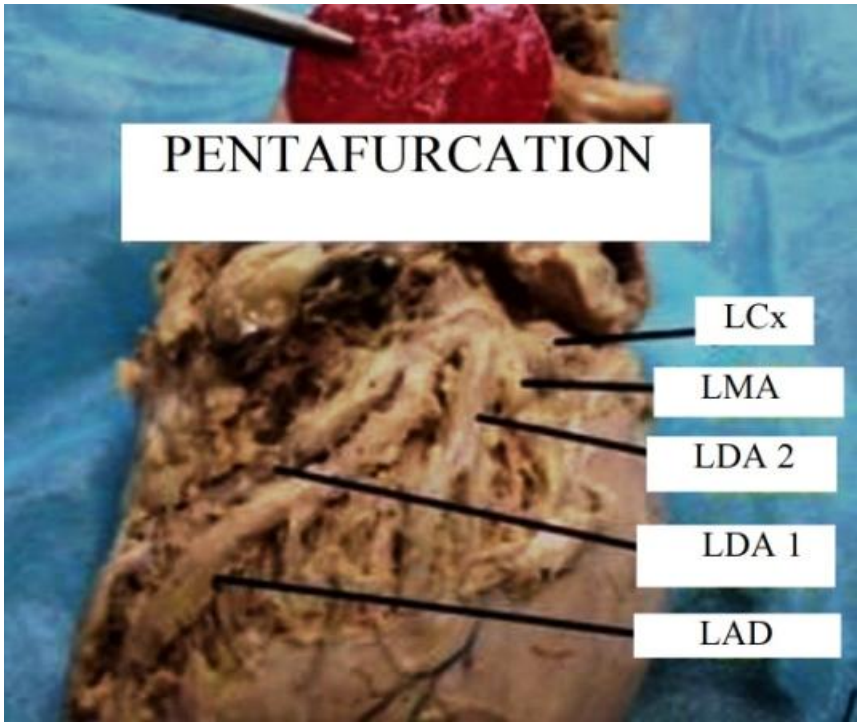

Fig 9:- Pentafurcation.

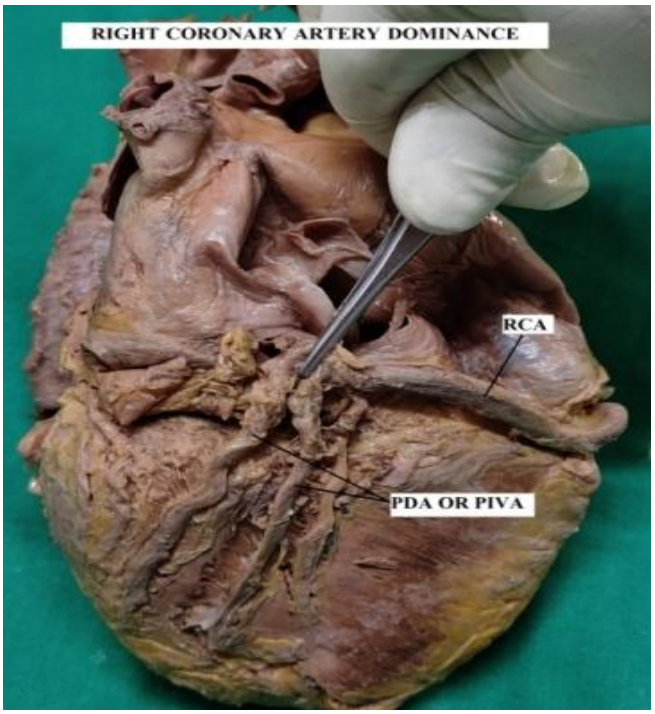

Fig 10:- Right Dominance.

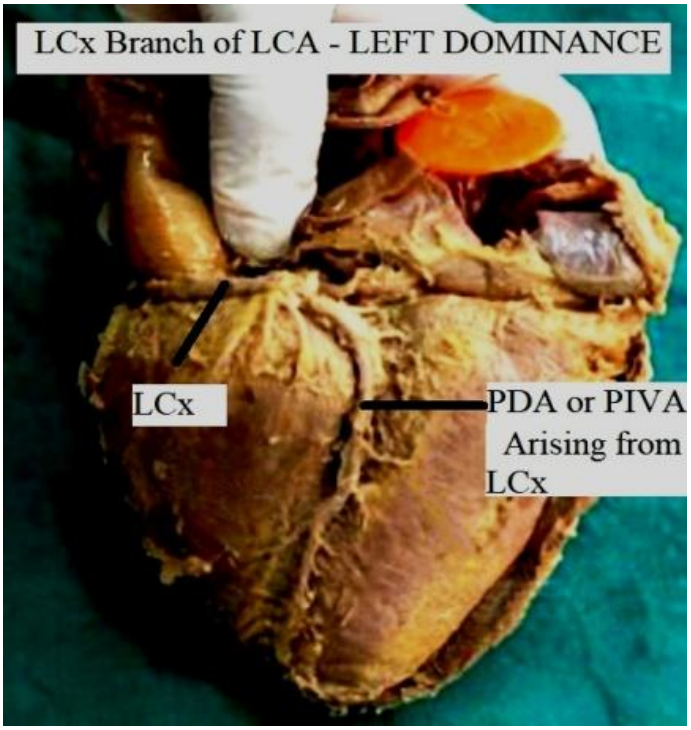

Fig 11:- Left Dominance.

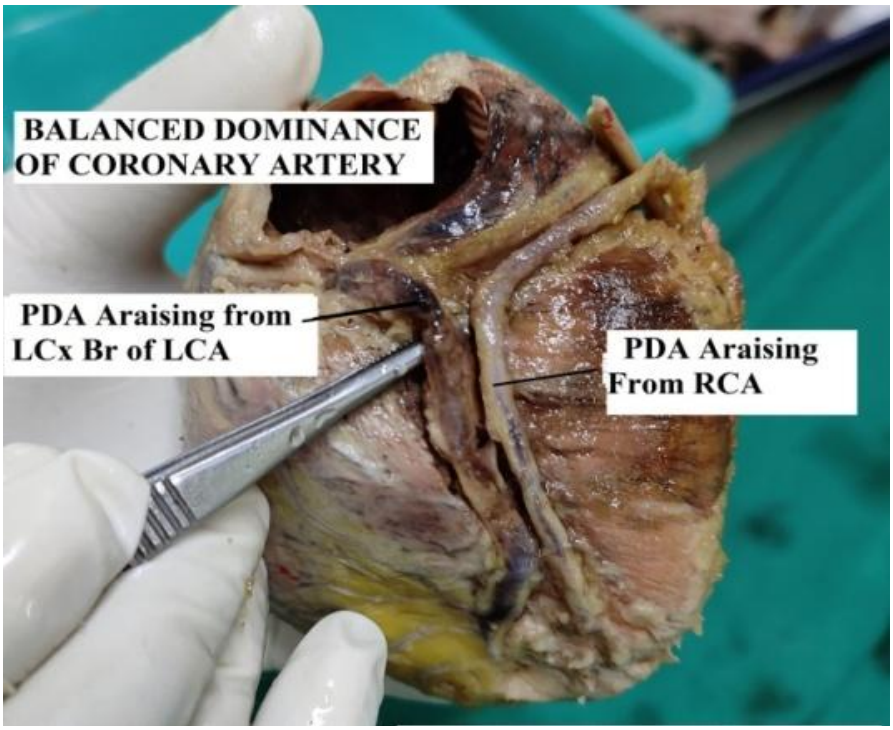

Fig 12:- Balanced Dominance of Coronary Artery.

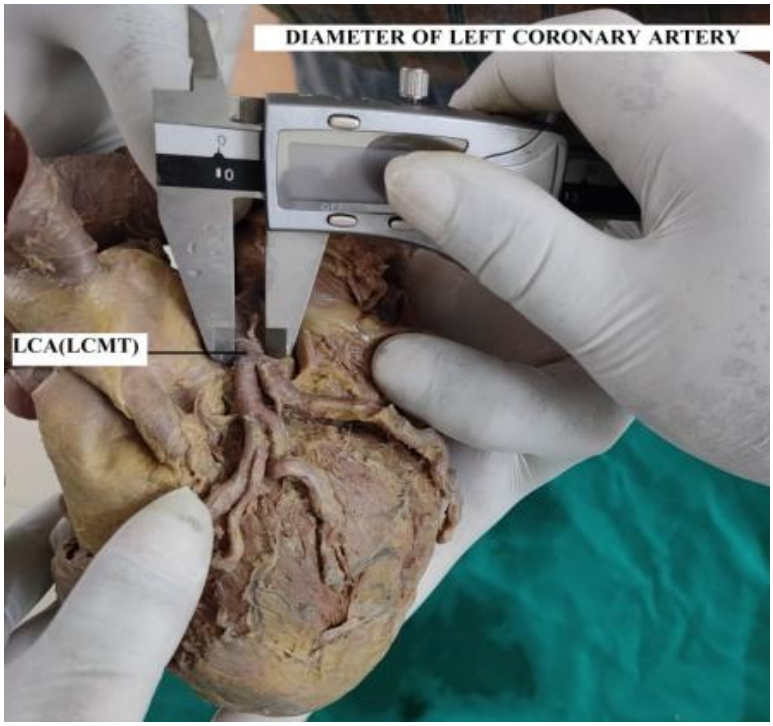

Fig 13:- LCA Diameter.

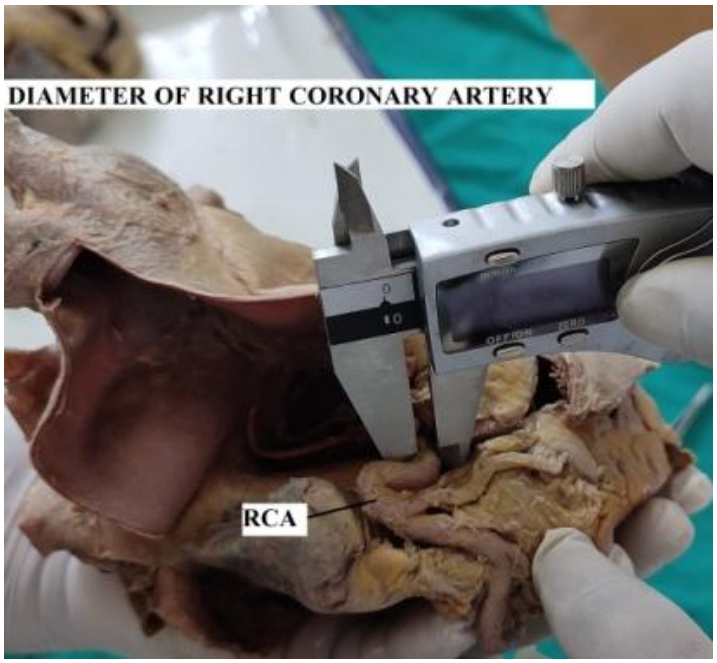

Fig 14:- RCA Diameter.

Discussion:-

These observations show comparison between the present study with previous studies.

In the present study the origin of RCA was seen in anterior aortic sinus in all hundred specimens and no other variations were found which is similar to the findings of Jyoti P Kulkarni et al, El Sayed S. Atta-Alla et al and Ashwini Vijay Bhele et al. Cavalcanti J S et al (1995) [15] found that in 1.82% of the cases LAD and LCX arose directly from the aorta.

Table 6:- Origin of right coronary artery.

Study	Right Anterior aortic sinus	Left posterior aortic sinus	Right posterior aortic sinus
Jyoti P Kulkarni	100%	0	0
El Sayed S. Atta-Alla et al	100%	0	0
Ashwini Vijay Bhele et al	100%	0	0
Present study	100%	0	0

The LCA arouse from left posterior aortic sinus in all 100 specimens and no variations were found. These findings were similar to those of Kalpana R, Jyoti P Kulkarni, Anil kumar et al, Lakshmiprabha et al and O.Pereira da Costa Sobrinho et al. The present study have value (100%) which is more than the value (98%) of Ashwini Vijay Bhele et al.

Table-7:- Origin of left coronary artery.

Study	Left posterior aortic sinus	Right posterior aortic sinus	Anterior aortic sinus
Kalpana R	100%	0	0
Jyoti P Kulkarni	100%	0	0
Ashwini Vijay Bhele et al	98%	2%	0
Anil kumar et al	100%	0	0
Lakshmiprabha et al	100%	0	0
O.Pereira da Costa Sobrinho et al	100%	0	0
Present Study	100%	0	0

In the present study, length of main trunk of right coronary artery in 8 specimens was 9-10 cms, in 72 specimens ranged between 10.1-11 cms, in 8 specimens ranged between 11.1-12 cms, in 12 specimens ranged between 12.1-13cms. The mean of these values was 10.75 cms with a range in between from 9.2 cms to 12.7 cms. The maximum length was 12.7 cms. The minimum length was 9.2 cms. The mean length of the RCA coincides with that of mean length of both segments (first segment and second segment) ElSayed S. Atta-Alla et al and Vathsala et al, The range of the coronary artery (9.2 to 12 cm) coincides with the range of Ashwini Vijay Bhele et al and combined length of first segment (5.7 to 8 cms) and second segment (3.4 to 6 cm) of El Sayed S. Atta-Alla et al , it is greater than range of Jyoti P Kulkarni (4.5 to 7 cm) but lesser than venkateshwer Reddy et al(10 to 13 cm) (Table-8).

Table 8:- Range of right coronary artery.

Study	Range of RCA
Jyoti P Kulkarni	4.5 to 7 cms
El Sayed S. Atta-Alla et al	First segment -5.7 to 8 cms Second segment -3.4 to 6.0 cm
Venkateshwer Reddy M	100 mm to 130 mm
Ashwini Vijay Bhele et al	6 cm to 17 cm
Present study	9.2 to 12cm

In the present study the LCMT runs forwards between the pulmonary trunk and the left auricle, and then it runs in the left atrioventricular groove in all hundred specimens. No variations were observed and findings of the study correlate with the findings of Henry Gray and Chummy S. Sinnatamby.

In the present study, found that LCMT in 16 specimens were less than 9.5 mm, 14 specimens were ranged between 9.6 - 9.9 mm, 16 specimens were ranged between10-10.1mm, 32 specimens were ranged between 10.2-10.3 mm, 16 specimens were ranged between 10.4-10.6 mm, and 2 specimen was in a range between 10.6- 25 mm with an average value of 10.2 mm and with a range between 3mm to 25 mm. The mean value of the study (10.2mm) is similar to the Anil kumar et al (10.2mm), it is greater than the values of Jyoti P Kulkarni (7mm) and O.Pereira da Costa Sobrinho et al (8.53 mm). Range of the length of LCMT (3mm to 25 mm) was similar to Venkateshwer Reddy M et al, but it is greater than O.Pereira da Costa Sobrinho et al (1.9 mm to 22.7 mm) and Anil Kumar et al(2mm to 16 mm)(Table- 9).

Table 9:- Length of LCA.

Study	Length of LCA
Jyoti P Kulkarni	7 mm
Anil kumar et al	10.2 mm
O.Pereira da Costa Sobrinho et al	8.53
Venkateshwer Reddy M et al	25 mm
Present study	10.2 mm

In the present study The RCA runs forwards between the pulmonary trunk and the right auricle, and then it descends almost vertically in the right atrioventricular groove up to the junction of the right and the inferior borders of the heart, it turns posteriorly and runs inthe posterior atrioventricular groove up to the posterior inter-ventricular groove and it terminates by anastomosing with the LCA in posterior atrio ventricular groove in 98 specimens. Two variations were observed (Table-10). And the findings correlate with the findings of Henry Gray.

In the present study, termination of RCA occurs between acute margin and crux of heart in 4 specimens (8%), at posterior Interventricular artery or crux in 6 specimens (12%), in between crux and obtuse margin of the heart in 38 specimens (76%), at the obtuse margin of the heart in 2 specimens (4%) This finding correlates with Anbumani et al and Bhele et al.

In the present study, RCA terminating In-between the right border of the heart and crux of the heart was 4% which was smaller when compared to Hirak Das et al (8.57%), Anbumani et al (16%) and Bhele et al (20%),

in contrast the present study had 4% of hearts terminating in between the right border of the heart and crux of the heart which is greater than zero percentage in the study of Al Sayed et al.

In the present study, RCA at the crux of the heart was 12% which was smaller when compared to Hirak Das et al (18.57%), Anbumani et al (20%) and Bhele et al (16%) and El Sayed et al (40%).(Table-10) and chart-5). In the present study, the maximum number of RCA terminates in between the crux and the left border of the heart (76%) which was larger when compared to Hirak Das et al (58.57%), Anbumaniet al (60%) and Bhele et al (60%) and Al Sayed et al (50%).

In the present study, RCA at the left border of the heart and beyond was 4% which was similar to Anbumani et al (4%) and Bhele et al(4%) and but was smaller when compared to Hirak Das et al(10%) and Al Sayed et al (10% In the present study, RCA terminating at the crux of the heart was 12% which was smaller when compared to Hirak Das et al(18.57%), Anbumani et al (20%) and Bhele et al(16%) and El Sayed et al (40%).)

Table 10:- Termination of RCA.

Study	From the right border to crux of the heart	At the crux of the heart	From the crux to left border of the heart	At the left border andbeyond
Hirak Das et al	8.57%	18.57%	58.57%	10%
Al Sayed et al	0	40%	50%	10%
Anbumani et al	16%	20%	60%	4%
Bhele et al	20%	16%	60%	4%
Present study	4%	12%	76%	4%

In the present study the LCA divides into two branches (bifurcation) in 76 specimens (76%), into three branches (trifurcation) in 20 specimens (20%), into four branches (quadrifurcation) in 2 specimens (2%), into five (pentafurcation) branches in 2 specimens (2%). These findings correlate with the Anil kumar et al and Anbumani et al as a whole.

In the present study bifurcation (76%) of the LCA was lesser than Jyoti P Kulkarni (84%) and Anil kumar et al (80.76%). And it was greater than the Kalpana R (47%), Anbumani et al (70%), J.P. Patel et al(74%).O.Pereira da Costa Sobrinho et al (39.68%) and Lakshmi Praba et al(54.54%), Partik Khona et al (57.66%), (Table 11).

In the present study trifurcation (20%) of the LCA was lesser than Jyoti P Kulkarni (16%) and Anil kumar et al (10.25%). And it was greater than the Kalpana R (40%), Partik Khona et al (37.66 %) Anbumani et al (26%), J.P. Patel et al (18%). O.Pereira da Costa Sobrinho et al (52.38%) and Lakshmi Praba et al (41.82%) (Table 11).

In the present study Quadrifurcation (2%) of the LCA was lesser than Anil kumar et al (7.69%), Kalpana R (11%), Anbumani et al (4%), Partik Khona et al (3.5 %) O.Pereira da Costa Sobrinho et al(7.94%), J.P. Patel et al(6%) and it was greater than Lakshmi Praba et al(1.82%) and Jyoti P Kulkarni (0%).(Table 11).

In the present study pentafurcation (2%) of the LCA which was more or less equal with J.P. Patel et al. Lakshmi Praba et al (1.82%), but it was higher than Anil kumar et al (1.28%), Partik Khona et al(1.18 %)

Kalpana R (1%) and Lakshmi Praba et al (1.82%) and Pentafurcation is absent in Anbumani et al (0%) Jyoti P Kulkarni (0), O.Pereira da Costa Sobrinho et al (0%) (Table 11).

Study	Bifurcation	Tri-furcation	Quadri-furcation	Penta-furcation
Kalpana R	47%	40%	11%	1%
Jyoti P Kulkarni	84%	16%	0 %	0%
Anbumani et al	70%	26%	4%	0%
Anil kumar et al	80.76%	10.25%	7.69%	1.28%
O.Pereira da Costa Sobrinho et	39.68%	52.38%	7.94%	0 %

al				
Lakshmi Praba et al	54.54%	41.82%	1.82%	1.82%
Partik Khona et al	57.66 %	37.66 %	3.5%	1.18%
J.P. Patel et al.	74%	18%	6%	2%
Present study	76%	20%	2%	2%

Table 11:- Branching pattern of LCA.

In the present study Right dominance is 88% which similar to the Kulkarni et al (90%), Kalpana R et al (89%), Bhele et al (92%), it is greater than Hirak Das et al (70%), Luis Esterno Ballesteros et al (76%), Anbumani et al (84%) and Bheemesh pusala (70%) (Table 12). In the present study Left dominance is 10% which similar to the Kulkarni et al (10%), Kalpana R et al(11%), Bhele et al (8%), it is lesser than Hirak Das et al (18.57%), Anbumani et al(16%) and Bheemesh pusala (15%), it is higher than Luis Esterno Ballesteros et al (6.2%),(Table 15 and Chart 13). In the present study balanced dominance was observed in 2% of the hearts, which similar to Reddy J.V. et al **(2013),** Bhele et al and Anbumani et al,where as it is nil when compared to Hirak Das et al (11.53%), Luis Esterno Ballesteros et al (17.2%) and Bheemesh pusala (15%).

Table 12:- Coronary dominance.

Name of the study	Right dominance	Left dominance	Balanced dominance
Kalpana R	89	11	0
Hirak Das et al	70	18.57	11.43
Luis Esterno Ballesteros et al	76	6.2	17.2
Jyoti P Kulkarni	90	10	0
Anbumani et al	84	16	0
Ashwini Vijay Bhele et al	92	8	0
Bheemesh pusala	70	15	15
Present study	88	10	2

In the present study, diameter of LCA at the origin was measured. It was found between 2.6 -3 mm in 4 specimens (8%), between 3.1 to 4 mm in 8 specimens (16%) , between 4.1-5 mm in 32specimens (64%), between 5.1-6 mm in 4 specimens (8%), between 6.1- 6.2 mm in 2 specimens (4%). The range of diameter of left coronary artery was 2.6 mm to 6.2 mm which correlates with Venkateshwer Reddy M. The average diameter of left coronary artery was 4.29 mm which coincides with the values of Nagaraj Mallashetty et al (4.28 mm) and Anil kumar et al (4.34 mm) (Table 13).

Table 13:- Mean value of RCA & LCA diameter.

Name of the study	Mean value of RCA diameter	Mean value of LCA diameter
Luis Esterno Ballesteros et al	3.42+-0.66 mm	---
Nagaraj Mallashetty et al	4.01+-0.48 mm	4.28+-0.90mm
El Sayed S. Atta-Alla et al	5.1+-0.7mm	---
Anil Kumar et al	---	4.34+- 2.01mm
Present study	3.2mm	4.29 mm

Conclusion:-

The present anatomical study of coronary arteries and its branching pattern in costal andhra pradesh population and its branching pattern and distribution of coronary arteries shows some difference with respect to the results from the available literature. Although numerous data on the variations of the coronary arteries have been reported, further exploration in this field would still enrich the knowledge on them and it is also essential in view of their great clinical significance. The preset study also showed the importance of the better anatomical knowledge about the Coronary arteries and its variations is essential for cardiologists to assess the risk factors for occurrence in coronary artery diseases (CAD'S), and for better interpretation by radiologists and Surgeon's in Coronary Angiography's, Coronary angioplasty's and Coronary artery bypass graft.

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