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ARS Medica Tomitana - 2018; 3(24): pag. 164 - 174
doi: 10.2478/arsm-2018-0030

MORPHOLOGICAL FEATURES ON MYOCARDIAL BRIDGES AT THE ANTERIOR INTERVENTRICULAR ARTERY

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ABSTRACT

Are described morphological features of myocardial bridges at the anterior interventricular artery obtained from the analysis of 274 cases with 312 myocardial bridges detected by angioCT performed over a period of 3.5 years on a total of 2857 subjects. CT examinations were performed on 1496 females, aged 56-79 years, and 1361 male subjects aged 34-74 years. At the level of the anterior interventricular artery we encountered 231 cases with myocardial bridges (84.31% of the total number of cases), being 267 myocardial bridges (85.58% of the total bridges analyzed). In the case of single myocardial bridges of the anterior interventricular artery, in 65 cases (33.33% of the 195 cases) they were located in the upper third of the artery, 32 cases were female (31.68% of female myocardial bridges) and 33 in male sex (35.11% of male myocardial bridges). In 129 cases (66.67%) were located in the middle third of the artery, 69 cases were female (63.30% female myocardial bridges) and 60 cases in male (64.89% of male myocardial bridges) . In one case with three myocardial bridges, the inferior myocardial bridge was located in the lower third of the anterior interventricular artery. The length of the myocardial bridge was between 11.9 and 73.1 mm, for the female gender being 11.9-28.7 mm, and male 9.4-73.1 mm. The thickness of the myocardial bridge was found between 0.9-5.7 mm, for the female gender being 0.9-5.2 mm, and for the male the thickness was 1.7-5.7 mm. The caliber of the tunneling artery was found between 1.2-2.5 mm in female gender, for the male gender 1.3-4 mm.

Keywords: anterior interventricular artery - myocardial bridges – morphology

Introduction.

The myocardial bridge is a congenital abnormality in which a coronary artery branch has an intramiocardial tract in a certain segment thereof, at a variable depth in the subepicardial myocardium which, after (1,2), was due to a defect in the resorption of subepicardial periarterial muscles , as a result of an evolutionary remnant in the genetic code. (3,4,5,6) consider it a congenital anomaly, being a common, normal (6,7,8,9) anatomical variant that is benign (10, 11). The myocardial tissue that covers the artery is called a myocardial bridge, and the artery covered by myocardial tissue is called a tunneling artery or tunneling segment. The myocardial bridge was described in 1737 by autopsy by Reyman and Iwin (1,4,6,12-17) and then by Black in 1805 (14,15) a deep analysis of its features being made by Geiringer in 1951 (1,13-15,18). After (18,19,20), the first documentation on myocardial bridges would be made in 1920 by the romanian Crăiniceanu. In 1960, Portsman and Iwig made their first radiological description (1,4,6,12,13,14,16,17). The frequency of myocardial bridges discovered by angiography varies between 0.87% (17) and 58% (21), and is less than the frequency of cases discovered by autopsy or dissection, ranging from 41% (12) to 8% (Stables). The myocardial bridge most common concerns an arterial segment (14), and rarely a collateral or terminal branch

of a coronary artery (2). Also, the frequency of location of myocardial bridges differs greatly, most of the authors considering that the presence of the myocardial bridge in the left coronary artery, and the most frequent occurrence is at the level of the anterior interventricular artery, the statistics being very variable ranging from 35.37% (22) to 94.97% (9) or even 96.52% (23). Myocardial bridges are classified as complete or incomplete, being single or multiple (two, three in the same artery or different coronary branches). Depending on the thickness of the myocardium covering the myocardial bridge, it may be superficial, more frequently, having a thickness of 0.3-2mm, or deep, having a thickness greater than 2mm. The length of myocardial bifurcation may be between 4 mm (16) and 45 mm (15), often between 40-42.8 mm (12, 16, 22, 23, 24). The clinical significance of myocardial bridges is still questionable, with debates on asymptomatic myocardial bridges and symptomatic myocardial bridges (most of the authors) may be a contributing factor to cardiac complications (systolic compression, myocardial ischaemia, angina pectoris, circulatory disturbances, conductive disturbances, myocardial infarction, sudden death), disorders that requires a medical treatment or surgery. There are authors who state that myocardial bridges provide a "protective effect" for atherosclerosis within the coronary artery (12, 19, 20, 21, 26, 27).

Materials and methods

Our results on the morphological characteristics of myocardial bridges were obtained from the CT coronarography analysis, the patients being from the Dobrogea area, the coronarographies being performed on a GE LightSpeed VCT64 Slice CT. The CT examinations were performed on a total of 2857 people, of which 1496 were female (52.36% of cases), aged between 56-79 years and 1361 male (47.64% of cases) aged 34-74 years. The study was conducted over 3.5 years (2011-2014), with 452 persons, 238 female and 214 male subjects being examined in 2011; in 2012 were examined 694 persons, 363 female and 331 male; in 2013, 1050 people, 549 female and 501 male, were examined; in the first six months of 2014, 661 people, 346 female and 315 male subjects were examined. The following were observed: location, length and thickness of the myocardial bridge, diameter and surface of the tunneling vessel, the patients sex and age.

Results

At the level of the anterior interventricular artery, 231 cases with myocardial bridges (84.31% of the total cases and 93.15% of the left coronary artery) occurred, with 267 myocardial bridges (85.58% of the total bridges analyzed and 94.01% of the left coronary artery bridges), 195 bridges being unique (62.5% of the total bridges, 68.66% of the left coronary artery bridge and 73.03% of the anterior interventricular artery bridges) in 36 cases there were double bridges (13.14% of all cases, 14.52% of left coronary arteries and 15.58% of anterior interventricular arteries), thus 72 myocardial bridges (23.08% of total bridges, 25,35% of the left coronary artery bridge and 26.97% of the anterior interventricular artery bridge).

In female interventricular artery, we have met 122 cases with myocardial bridge (44.23% of all cases, 49.19% left coronary artery, 52.81% of anterior interventricular artery cases and 85.40% of cases females), finding 143 myocardial bridges (45.83% of total bridges, 50.32% of the left coronary artery bridges, 53.56% of anterior interventricular artery and 94.70% of female myocardial bridges). Single myocardial bridges were 101 cases (32.37 of all myocardial bridges, 35.56% of left coronary artery bridges, 37.83% of anterior interventricular artery bridges, and 66.89% of female myocardial bridges). In 21 cases (7.66% of all cases, 8.47% of cases of left coronary artery, 9.09% of cases of anterior interventricular artery and 17.21% of female cases) myocardial bridges were doubled, being 42 myocardial bridges (23.08% of total bridges, 25.35% of left coronary artery bridges, 53.56% of anterior interventricular artery and 27.81% of female bridges).

For men, at the level of the anterior interventricular artery, we encountered 109 cases with myocardial bridges (39.78% of all cases, 43.95% of cases of left coronary artery, 47.19% of cases of anterior interventricular artery and

83.21% of the male cases), and there are 124 myocardial bridges (39.74% of the total bridges, 43.66% of the left coronary artery bridges, 46.44% of the anterior interventricular artery bridges and 94.66% of the male myocardial bridges). Single myocardial bridges were in 94 cases (3.13% of total bridges, 33.1% of the left coronary artery bridge, 32.21% of the anterior interventricular artery bridges, and 86.24% of the male myocardial bridges). In 14 cases (5.11% of all cases, 5.65% of left coronary artery cases, 6.24% of previous interventricular artery cases and 11.29% of male cases) were doubled, there were 28 myocardial bridges (8.97% of total bridges, 9.82% of the left coronary artery bridges, 10.49% of the anterior interventricular artery bridge, and 22.58% of the male bridges).

We encountered only one case (0.36% of all cases, 0.40% of the left coronary artery cases, 0.43% of the anterior interventricular artery cases and 0.92% of male cases) with 3 myocardial bridges in the anterior interventricular artery (0.96% of total bridges, 1.05% of left coronary artery bridges, 1.30% of anterior interventricular artery bridges and 2.03% of male bridges) in a male subject, 70 years-old, the bridges location in the cranio-caudal direction being the following: superior, 0.9 mm thick in the upper middle third of the artery, 43.1 mm long and 1.7 mm tunneling diameter ; middle, 2.1 mm thick, located in the middle 1/3 of the anterior interventricular artery, a length of 11.9 mm and a tunneling diameter of 1.8 mm; inferior, 1.6 mm thick, located in the lower third of the artery, 16.7 mm long and 1.8 mm tunneling diameter; is the only case where we have encountered a myocardial bridge at the lower third of the anterior interventricular artery.

In the case of single myocardial bridges of the anterior interventricular artery, in 65 cases (33.33% of the 195 cases) they were located in the upper third of the artery, 32 cases were female (31.68% of female bridges) and 33 in male (35.11% of male bridges). In 130 cases (66.67%) were located in the middle third of the artery, 69 cases were female (63.30% female bridges) and 61 cases male (64.89% of male bridges).

In both genders, we have not encountered any case where the myocardial bridge (single or double) to be located in the terminal segment of the anterior interventricular artery. For double bridges in the anterior interventricular artery, one of them was located in the upper third of the artery and the other in the middle third of the artery.

The length of the myocardial bridge was between 11.9 and 73.1 mm, the female gender being 11.9-28.7 mm, and the male gender 14-73.1 mm. Thickness of the myocardial bridge was 0.9-5.7 mm, with female gender 0.9-5.7 mm, and male 1.7-5.7 mm. The myocardial bridge area was between 1.3-4.5 mm2 in females, and in the male gender between 1.2-5.6 mm2. The caliber of the tunneling artery was found to be between 1.2-2.2 mm in females, and in male to 1.3-4 mm.

Discution

Table 1 The location frequency of the anterior interventricular artery myocardial bridges

Author	Myocardial bridges number	Anterior interventricular artery bridges
Irvin	35	35 - (100%)
Gow	200	69 - (34,5%)
Konen	47	34 - (72,34%)
Kantarci	22	22 - (100%)
Loukas	69	35 - (50,72%)
Zeina	78	48 - (61,54%)
Carrascosa	159	104 - (65,41%)
Liu H	174	167 - (95,98%)
Jin Ho Hwang	557	550 - (98,74%)
Jodocy	50	34 - (68%)
En-Sen Ma	389	235 - (60,41%)
Yu-Jun Niu	140	120 - (85,71%)
Sildiroglu	93	81 - (87,1%)
Personal cases	**312**	**267 - (85,58%)**

(23) found the location of myocardial bridges at the anterior interventricular artery in 96.52% of cases, (27) in 95%, (35) in 84.71%, and (19, 20) in 70% of cases. (36) states that myocardial bridges are met at the anterior interventricular artery, and (25,26) states that the higher frequency of myocardial bridges in this artery is not in relation to age, sex or ethnicity. The most common differences in the location of myocardial bridges occurred in the anterior interventricular artery, where the percentages

ranged between 34.5-100% of the cases, (28, 30) found only at the level of this artery. Our results are lower by 0.13-14.42% of cases compared to the results found at (9,23, 27, 28, 31, 33, 34) and higher by 0.87-51.08% of cases in relation to (4, 14, 19, 20, 24, 26, 29, 32, 33, 35). The unique myocardial bridges at IVA level were found in 195 cases, 62.50% of all bridges and 68,99% of the left coronary artery myocardial bridges, and double bridges we met in 36 cases (72 myocardial bridges), 23,06% of all bridges and 26,97% of the left coronary artery myocardial bridges. (9) finds a single case (0.18% of cases) with 3 myocardial bridges located at the anterior interventricular artery, a variant tha we have also encountered in one case.

Table 2 The location of the single myocardial bridges in the anterior interventricular artery

Author	Upper third	Middle third	Lower third
Irvin	-	59.12%	6.29%
Cay	-	52.79%	47.21%
Kantarci	9.09%	68.18%	22.73%
Konen	-	57.45%	14.89%
Johansen	-	69%	-
Carrascosa	-	90.38%	9.62%
Jin Ho Hwang	0.36%	96.18%	3.45%
Wirianta	13.2%	77.6%	9.2%
Donkol	-	24.6%	3.7%
En-Sen Ma	-	60.41%	-
Yu-Jun Niu	-	74.29%	11.63%
Muzafer	6.1%	47.5%	9.8%
Personal cases	**33.33%**	**66.67%**	**-**

The location of the anterior interventricular artery myocardial bridges was found at the upper third level of this artery more frequently by 21.86-34.68% versus (9, 30, 38, 39), this localization not being reported by (4, 23). The largest variations we encountered in the location of myocardial bridges at the middle third of the anterior interventricular artery, our results being lower by 2.47-41.20% versus (4, 9, 24, 28, 30, 33 , 37, 38), but higher by 2.19-30.38% than the results of (5, 23, 39).

Figure 1 Myocardial bridge located in the upper third of the anterior interventricular artery male gender, 1.8 mm thick, 32.5 mm long; tunneling artery diameter of 1.2 mm (+ 39.4%) and 1.2 mm² area (+ 64.5%).

We did not encounter myocardial bridges located in the lower third of the anterior interventricular artery, aspect reported in a percentage of 3.45-47.21% by (5, 9, 23, 24, 28, 31, 38, 33, 39, 44). After (27) myocardial bridges are located at the middle and distal third of the anterior interventricular artery in 95% of cases and after (35) they are located at the same levels as (27) in 84.71% of cases. (40) finds them most frequently in the middle of the anterior interventricular artery, (19, 20) quoting Wissler, states that they are most commonly located at 2-3 cm from the origin of anterior interventricular artery, (41) placing them most frequently at 2 cm of the left coronary artery ostium.

Table 3 The thickness of the myocardial bridges

Author	Thickness (mm)	Average thickness(mm)
Kantarci	1.2-3.3	2.5
Guang	1-35	-
Jacobs	-	2.6
Jin Ho Hwang	-	3 +/-1.4
Jodocy	-	2.6+/-1.6
Li Jian-Ju	1-4	-
Donkol	1-6.2	2.3+/-3.9
En-Sen Ma	1.6-5	2.7+/-0.7
Yu Jun Niu	-	2.15+/-0.74
Muzafer E	0.5-7	-
Personal cases	**0.7-5.7 Male: 1.7-5.7 Female: 0.7-5.2**	**3.01**

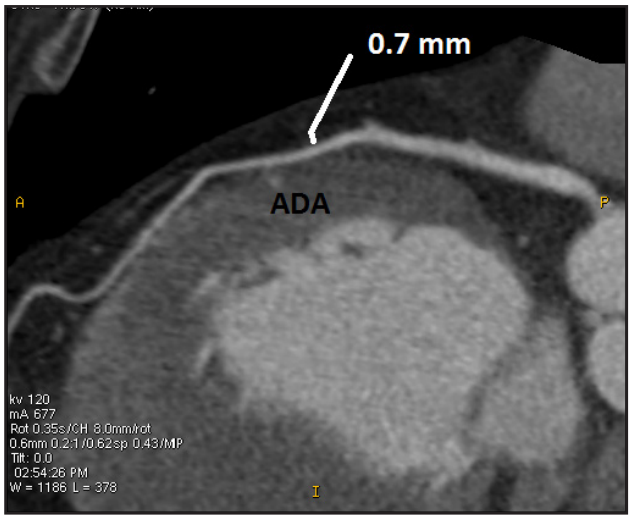

Figure 2 Myocardial bridge located in the middle third of the anterior interventricular artery in the female gender, 0.7 mm thick.

In terms of thickness of myocardial bridges, we found it higher in male gender than female gender, with the difference being 0.5 mm in the case of the maximum thickness and 1 mm in the case of the minimum thickness. The minimum thickness found by us is smaller by 0.3-0.9 mm from (4, 12, 24, 26, 30) and 0.2 mm larger than the minimum thickness found by (28). The maximum thickness we found is smaller by 0.5-1.3 mm compared to (5, 39) and higher by 0.7-2.4 mm from the maximum thickness found by (16, 30, 33, 42). By comparing the average thickness of the myocardial bridge found by us with the literature data, we have always found it higher by 0.01- 0.86 mm versus (9, 30, 32, 33, 40). The largest thickness of the myocardial bridge was found at the anterior interventricular artery, followed by the thickness at the right coronary artery, at the circumflex and left marginal arteries, the myocardial bridges having a close thickness, but smaller than the first two arteries. Thickness of myocardial bridges is different in systolic and diastolic, with the systole being thicker by 0.1-1 mm.

Myocardial bridges may be complete and incomplete and, after their thickness, have been classified into superficial and deep. After (9) myocardial bridges are superficial when they have a thickness equal to or greater than 1 mm and after (32) when they have a thickness greater than 2 mm. (9) finds superficial myocardial bridges in 66,07% of cases, of which 65,22% of cases are complete, the deeper myocardial bridges found in 33,93% of the cases. (34) find the superficial myocardial bridges in 65.43% of the cases, the deep ones being in 34.57% of the cases. (43) found the incomplete superficial myocardial bridges in 40.91% of cases, the complete superficial ones in 18.69% of the cases, the deep ones finding them in 40.40% of the cases. (32) finds at the anterior interventricular artery level that deep myocardial bridges are more common (58.82% of cases) than superficial (41.18%). We found that the superficial myocardial bridges (with a thickness less than 2 mm) are in a percentage of 42.31% of cases, the deep ones being more common (57.69% of cases). We found great differences in the two genders, in male gender the superficial myocardial bridges were in a percentage of 28.57% of cases, while in female the superficial myocardial bridges we found it in 42.31% of the cases, the deep myocardial bridges being more common in male with 29.76% of female. Compared to the results from the literature, the superficial myocardial bridges we found it in a lower percentage by 2.29-23.76% compared to (9, 32, 34, 43), towards these authors finding deep myocardial bidges more frequent with 19,93 - 27.18%. In the case of double myocardial bridges, we found at the level of the anterior interventricular artery that the lower bridge had a lower thickness with 0.4-1.6 mm.

Table 4 The length of myocardial bridges.

Author	Lenght (mm)	Average lenght (mm)
Kantarci	6-12	17
Konen	13-40	-
Sirus	-	19.6+/-4.9
Guang	-	2.32+/-0.95
Liu H	5-120	30.5
Qian Ju-Ying	-	20.9+/-7.5
Ll Jian-Ju	4-40	-
Donkol	6-24	15+/-7
En-sen Ma	8-40	17.6+/-5.7
Yu-Jun Niu	-	21.8+/-5.98
Jodocy	-	14.8+/-6.5
Muzafer	5-40	-
Personal cases	**9.4-73.1 Male: 9.4-73.1 Female: 11.9-28.7**	**26.51 28.95 20.66**

For (40) the myocardial bridge length is 23.4 mm and for (14) 31 mm. (17) finds that the myocardial bridge length is up to 10 mm in 5.26% of cases, in 42% of cases the myocardial bridge length was 10-20 mm, and in 26.32% of myocardial bridges the length was over 20 mm. For (27) the myocardial bridge length is up to 10 mm in 58% of cases, in 32% of cases the myocardial bridge length is between 10-20 mm and in 10% of cases the myocardial bridges had a length of over 20 mm.

We found described in the literature that the length of myocardial bridges as being between 4-120 mm, and we found it between 9.4-73.1 mm. The minimum length in the literature (4-13 mm) is less than that we found by 1-5 mm (5, 16, 24, 30, 31, 33, 39). The maximum length of myocardial bridges in the literature is 12-120 mm, being less than that we found by 31.1-61.1 mm at (16, 24, 30, 33, 39) and greater by 46,9 mm from (31). The average length of the myocardial bridges, which we found 26.51 mm, is higher than in the literature with 4.71-24.19 mm versus (5, 17, 30, 32, 33, 42, 44) and smaller by 3.99 mm from (31).

The smallest length of myocardial bridge we found it at the anterior interventricular artery, male gender, the female gender having the minimum length higher with 2.5 mm. The largest length was found in the right coronary artery, male gender, and the maximum length of myocardial bridge was smaller with 44.4 mm.

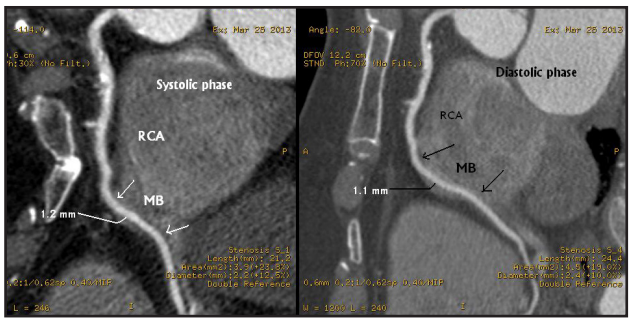

Figure 3 Myocardial bridge located in the upper third of the posterior interventricular artery in female gender. In the systole the thickness of the myocardial bridge is 1.2 mm, the length of 21 mm, the tunneling diameter of 2.2 mm (+ 12.5%) and the area of 3.9 mm^2 (+ 33.8%). In diastole the thickness of the myocardial bridge is 1.1 mm, the length of 24.4 mm, the tunneling diameter of 2.4 mm (+ 10.0%) and the area of 4.5 mm^2 (+ 19.0%).

At the level of the anterior interventricular arteries the length of myocardial bridges was 9.4-34.3 mm, the average being 23.5 mm, the male gender 9.4-34.3 mm (average 25.08 mm), and female gender of 11.9-24.4 mm (average 20.66 mm). Thus, between the maximum length of myocardial bridge in the two genders there is a difference of 9.9 mm, the difference between the average length being 4.22 mm, both differences in favor of the male gender. Myocardial bridges had a longer length in diastole than the systole, with a difference of 2-3.4 mm at the anterior interventricular artery.

Table 5 The tunneling artery caliber in systole

Author	Caliber (mm)
Konen	1.6 +/- 0.6
Donkol	1.6 +/- 0.5
En-sen Ma	1.1+/-0.4 (average 0.3-2.3)
Liu H	1.3 – 2.8 (average 2.3)
Personal cases	**1.2 – 2.2 (average 1.58)** **Male: 1.3 – 1.9 (average 1.6)** **Female: 1.2 – 2.2 (average 1.58)**

The largest caliber was found in the anterior interventricular artery in female gender, at the male gender the maximum caliber being 0.3 mm lower. The minimum caliber we found it the same for both genders, and the average caliber is higher for the male with only 0.02 mm. Compared with the literature, where the average caliber is between 1.1-1.6 mm, in our cases the average caliber is smaller by 0.02-0.78 mm versus (5, 24, 31) and higher with 0.48 mm from (33).

The caliber difference between arterial diameter at myocardial bridge and arterial caliber above the bridge was found to be between 0.4-0.8 mm in cases with deep myocardial bridges (being lower at the bridge level by 15.79-30%) , this difference being lower in cases with superficial myocardial bridges (0.1-0.3 mm), sometimes the tunneling artery can keep the caliber above the myocardial bridge. The diameter of the same artery below myocardial bridge is 0.1-0.3 mm higher, 6.25-9.52% higher than myocardial bridge. In the diastole, the caliber returns to normal, but in over 30% of cases it persists in a reduced decrease.

Figure 4 Double myocardial bridges case located on the anterior interventricular artery in male gender: first one(superior) located in the upper third having a thickness of 2.1 mm; the second one (inferior) located in the upper part of the middle third, with a thickness of 0.9 mm.

The diameter of the tunneling anterior interventricular artery was found in the systole between 1.3-2.2, in the male gender the maximum diameter being 0.3 mm smaller than the female gender. The systolic / diastolic caliber difference of the tunneling artery in the anterior interventricular artery we found it higher in the diastole by 0.1-0.7 mm.

After (3) the diameter of the tunneling artery is reduced by up to 25% after (6) the artery can be compressed between 15-70%, reaching up to 90% after (45) and (46) reducing the diameter in the systole of the anterior and posterior interventricular arteries can reach up to 90-100%. (24) finds the caliber reduction at the bridge level by 0.6 mm. (47) finds a sudden stenosis in the systole (24.36%), in the diastole being normal. (17) finds the caliber reduction in myocardial bridge by up to 50% in 47.37% of cases, up to 70% in 31.58% of cases, up to 90% in 15.79% of cases and over 90% in 5.26% of cases. (26) found that in 70.51% of the cases there was an insignificant narrowing, only in 5.13% of the cases there was a significant narrowing in the systole. (21) found that a dynamic compression exists only in 13.33% of the cases, existent only (97.5%) in those with complete myocardial bridge on the anterior interventricular artery, regardless of the presence of the muscles above. After (45) the compression of the tunneling artery exists in 45.3-54.2% of the cases. (22) found the reduced caliber at the myocardial bridge level comparing to the proximal caliber in 47.37% of the cases. After (5) in the complete myocardial bridge the arterial diameter was reduced in systole to 8.10% compared to the proximal segment in 54.66% of cases, and in diastole the arterial lumen was decreased by 0.38 mm in 12.75% of the cases. (5) finds at the myocardial bridge level on the anterior interventricular artery reduction of the diameter by up to 1.2 mm from the proximal caliber in 42.86% of the cases.

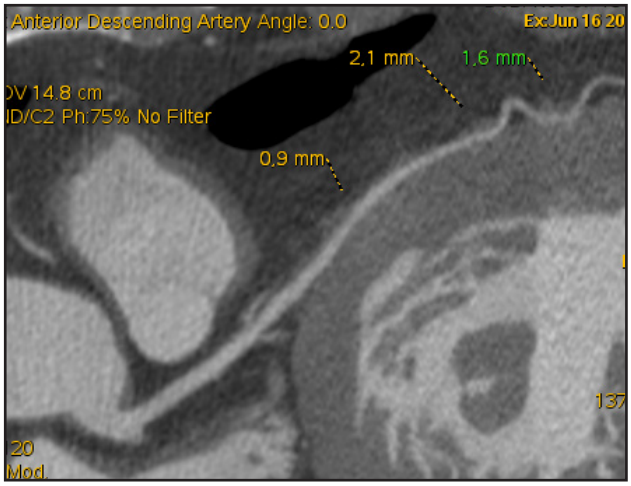

Figure 5 Case with 3 myocardial bridges: superior, in the upper part of the middle third, thickness: 0.9 mm; middle, in the lower part of the middle third, thickness: 2.1 mm; inferior, in the lower third of the anterior intervertebral artery, thickness: 1.6 mm.

The area was found to be between 1.2-3.9 mm^2, the minimum limit being the same for both genders, the maximum limit being higher for females by only 0.1 mm^2. At the anterior interventricular artery area, the area ranged between the same limits for both sexes (1.2-3.8 mm^2). Between systole and diastole the area showed a difference in IVA of 0.1-0.4 mm^2, in favor of diastole.

Conclusions

Our study is certainly unique in this area of Romania, treating the characteristics of myocardial bridges at the level of the anterior interventricular artery almost under

all morphological aspects. At the same time, a comparison of myocardial bifurcation characteristics with the results described by authors from all parts of the globe is made, as can be seen in the article and the bibliography.

Our results were obtained by coronary angiographic CT exams performed in people who addressed the physician for cardiac symptomatology, but also to those who addressed the specialist for a routine exam. The myocardial bridges are congenital disorders that raise important clinical problems through their complications, which frequently go to sudden death, the severity of a myocardial bridge being given by the length and especially the thickness of it, which are responsible for the degree of compression of the tunneling artery.

We have not encountered cases of myocardial bridges that might interest the anterior interventricular arterial branch over its entire length or at its terminal branch.

Taking into account the frequency of complications in people with myocardial bridges (see sudden deaths on sports grounds or at work), it is necessary to control coronary vasculature through angioCT, especially in performance athletes or those who make great efforts to exercise the profession, even when the person does not show any symptoms, making an active identification of the population. Last but not least, the importance of the presence of myocardial bridges for cardiac transplantation should be emphasized.

The statistical differences in literature are explained by the number of cases that the study performed, the performance of the device that has been worked and the attention and experience of the staff working in the respective medical service. We do not exclude predisposition to the frequency of myocardial bridges depending on the geographical area or even on ethnicity.

We also recommend the use of names in the existing international anatomical nomenclature

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