

## MYOCARDIAL BRIDGES IN MOUNTAIN LION (*Puma concolor*, Jardine-1834) (FELIDAE): A CASE REPORT

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### ABSTRACT

In the present study, the myocardial bridges of an adult, female, mountain lion that died of natural causes at the “Parque do Sabiá” Zoo, Uberlândia, Minas Gerais, Brazil were examined. The heart was fixed in a 10% formalin solution and the coronary arteries were injected with neoprene latex 450®. The myocardial bridge is a superficial muscular band that crosses a short segment of the coronary arteries on the epicardium at various locations in the heart. Twelve bridges were seen in this heart. Three crossed the first branch, five crossed the second branch and four crossed the fifth branch of the paraconal interventricular branch of the left coronary artery. The average length of the myocardial bridges was 2.08 mm (range 0.80-3.95 mm), the length of the left ventricle was 58.3 mm. Of the bridges examined 58.3% were in the medial third of the ventricle, 33.3% were in the apical third and 8.3% were in the basal third.

**Key words:** Coronary artery, mountain lion, myocardial bridge, *Puma concolor*

### INTRODUCTION

The myocardial bridge is generally defined as a superficial muscular band that extends across short segments of the coronary arteries located subepicardially in various parts of the heart. Anatomical studies of myocardial bridges have identified the occurrence, distribution, and type of myocardial bridges in various species [9,12,13,15], including human, and dogs [17].

The clinical significance of myocardial bridges in humans with cardiac problems has been a controversial issue for over 40 years, and it remains unclear whether myocardial bridges are involved in the induction of ischemic heart disease or merely exaggerate the symptoms in patients with heart conditions. This uncertainty partly reflects the lack of animal experiments on this subject [16]. Classic texts of Anatomy generally contain little information on myocardial bridges, and their description of this structure is restricted to systematic data, and the distribution of the coronary arteries [5,7,8,10].

Because the myocardial bridge is closely associated with coronary arteries, the mammalian heart has been classified into three types according to the loca-

tion of the coronary arteries: type A (hamster, squirrel, rat, guinea pig, rabbit), in which the coronary arteries are entirely embedded in the myocardium (also referred to as intramyocardial), type B (goat, sheep, dog, cat, monkey, human), in which the coronary arteries are predominantly subepicardial but have myocardial bridges, and type C (horse, cow, pig), in which the coronary arteries are entirely subepicardial. The myocardial bridge is considered to be a structure that is formed simultaneously with the coronary arteries during embryonic development [17]. The myocardial bridge is also known as a vortex fiber [9] or coronary tunnel [14], depending on its position in relation to the coronary arteries. The occurrence of myocardial bridges has been studied in various species and, in ruminants the frequency is 32% to 62.7% (R.C. Amaral, Doctoral thesis, Universidade de São Paulo, 1989) [1-4].

In a series of 30 domestic cats, myocardial bridges were found in 66.7% of the hearts examined, with similar frequencies in males and females [3]. Of the cats with bridges, 40% had one, 20% had two and 6.7% had three of these structures. In this hearts the left ventricular length was 20.3 mm with bridges 1.0-6.7 mm long (mean length: 3.4 mm). Approximately 63% of the bridges were located in basal third of the ventricle, 30% in the medial third and 6.7% in the apical third [3].

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The mammalian heart is supplied with blood from the left and right coronary arteries that originate in the aortic sinus [6]. After emerging from the right aortic sinus, the right coronary artery crosses the heart and enters the coronary groove ventrocranially. This artery frequently extends into the interventricular sub sinuous groove and supplies blood principally to the right ventricular wall. The left coronary artery divides into the interventricular paraconal and circumflex branches. The first of these branches continues down into the interventricular paraconal groove. The circumflex branch crosses over into the left coronary groove that extends into the atrial face of the heart, where it gives rise to the interventricular subsinuous branch [10,11]. The purpose of this report is to describe the occurrence, localization, and dimensions of myocardial bridges in mountain lion heart.

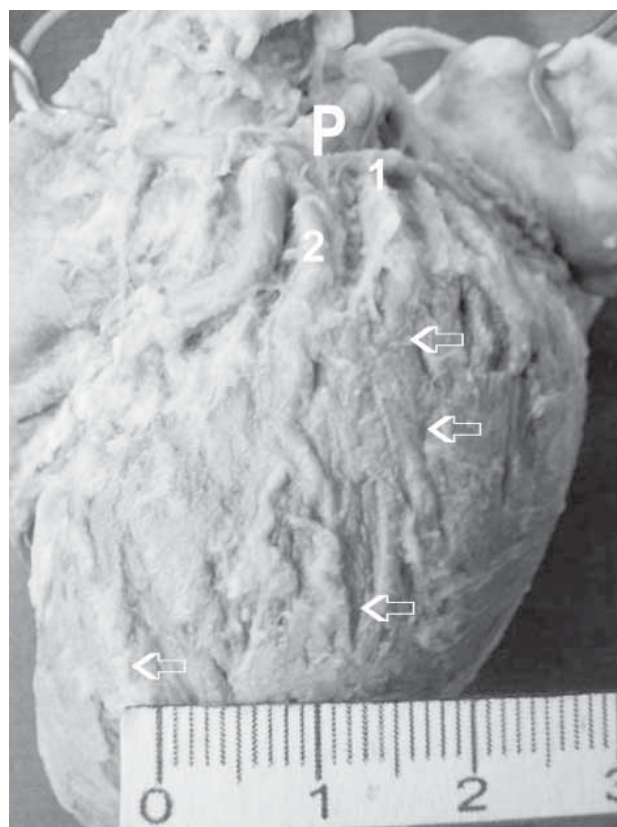
### CASE REPORT

An adult, female mountain lion that died in the "Parque do Sabiá" Zoo, Uberlândia, in the state of Minas Gerais, was autopsied and the heart was sent to the Laboratory of Wild Animal Research (LAPAS) of the Federal University of Uberlândia. The heart was fixed in 10% formalin and the coronary arteries were injected with neoprene latex 450®. During the dissection, the epicardial membrane and the subepicardial adipose tissue were removed. The coronary arteries were identified and the myocardial bridges were located. The lengths of the bridges were measured using a Starrett pachometer.

Myocardial bridges were observed crossing the interventricular paraconal collateral branches: three crossed the first collateral branch (Fig. 1), five crossed the second collateral branch (Fig. 1) and four crossed the fifth collateral branch. The bridges of the first collateral branch were 3.10 mm, 2.10 mm and 1.20 mm in length, those of the second collateral branch were 2.70 mm, 0.80 mm, 0.90 mm, 2.20 mm and 1.30 mm long and those of the fifth collateral branch were 2.10 mm, 3.65 mm, 3.95 mm and 1.05 mm long. The left ventricular length was 58.30 mm. Most (58.3%) of the myocardial bridges occurred in the medial third of the ventricle, with 33.33% in the apical third and 8.3% in the basal third. The mean length of the myocardial bridges was ( $\pm$ standard deviation) 2.08 mm  $\pm$ 1.08.

In carnivores, the left coronary artery is larger than the right coronary artery. The left coronary artery has interventricular paraconal, subsinuous and circumflex

branches. The right coronary artery crosses to the right to enter the coronary groove ventrocranially and frequently extends into the interventricular subsinuous groove [10]. This pathway was also seen in the heart examined here. In domestic cats, 50% of the bridges cross the paraconal interventricular branch [3] In contrast, in the mountain lion heart, all of the myocardial bridges crossed the paraconal interventricular branch.



**Figure 1.** Mountain lion heart showing the myocardial bridges (arrows) in the first (1), second (2) and fifth (3), branches of the paraconal interventricular branch (P).

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