



## Original Research Article

## Study of BROCQ and Mouchet triangles in human hearts – A cadaveric study and its clinical implication

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## ABSTRACT

**Background:** The aim of present study is to evaluate the pattern of occurrence of Brocq and Mouchet's arterio-venous triangle in human cadavers.**Methods:** The present study was carried out in the Department of Anatomy at SRMS IMS, Bareilly from 2012-2014. Thirty human cadavers of both sexes fixed in 10 % formalin were dissected to observe the triangle of Brocq and Mouchet.**Results:** The triangle was closed in 17 cadaveric hearts (56.66%). The triangle was opened in 13 cadaveric hearts (43.33%). It was opened inferiorly & superiorly in 5 cadaveric hearts (16.66%) each. The triangle was opened completely in rest of 3 cadaveric hearts (10%).**Conclusions:** The triangle of Brocq and Mouchet is commonly used when performing an intravascular ultrasound of coronary arteries to help in identifying pericardium, myocardium and vessels in the neighborhood.© 2020 Published by Innovative Publication. This is an open access article under the CC BY-NC license (<https://creativecommons.org/licenses/by-nc/4.0/>)

## 1. Introduction

The Brocq and Mouchet's arterio-venous triangle are a well-known topographic region which is formed by the intersection of the great cardiac vein, the circumflex artery and the anterior interventricular artery branches of the left coronary artery. On the left side of anterior surface of the heart, the Brocq and Mouchet triangle is located.<sup>1,2</sup>

The great cardiac vein one of the longest vein traverses anterior interventricular groove on sternocostal surface then it reaches on left surface of heart where it crosses anterior interventricular artery and circumflex artery. These relations of superficial great cardiac vein with anterior interventricular artery and circumflex artery are explained in the form of triangle. These triangles

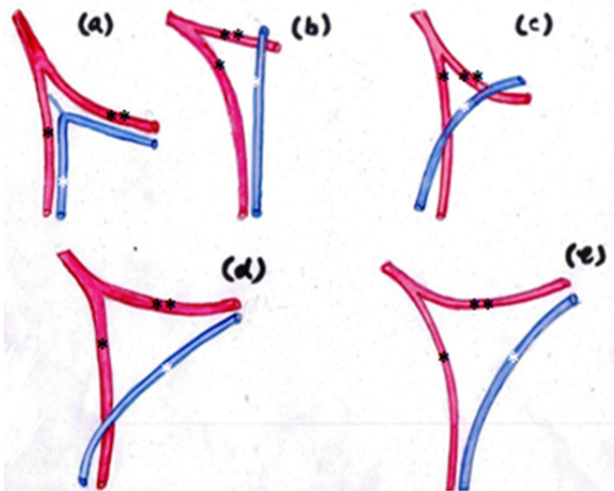
may be- closed, superiorly opened, inferiorly opened and completely opened. Rarely it may be absent.<sup>3,4</sup> This study is having importance in surgical procedures of heart. It is also important for interpretations in radiology and in catheter-based procedures.<sup>5</sup> The aim of present study is to evaluate the pattern of occurrence of Brocq and Mouchet's arterio-venous triangle in human cadavers.

## 2. Materials and Methods

The present study was carried out in the Department of Anatomy at SRMS IMS, Bareilly U.P from 2012-2013 after taking due clearance from ethical committee. Thirty human cadavers of both sexes fixed in 10 % formalin were dissected to observe the triangle of Brocq and Mouchet. Heart with congenital anomaly and traumatic hearts were excluded from study.

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**Fig. 1:** Schematic diagram showing types of Brocq and Mouchet triangle – a. absent b. inferiorly opened c. completely closed d. superiorly opened e. completely opened<sup>3,4</sup>

Great cardiac vein, circumflex artery and anterior interventricular artery were analyzed without dissecting them from adjacent adipose tissue so that their original anatomy was not disturbed.

They were analyzed regarding to their disposition in the triangle and the relations between them. (Figure 1)

1. Absent
2. Inferiorly opened
3. Completely opened
4. Closed
5. Superiorly opened

Various types of triangle depending on the disposition of blood vessels forming it were observed and photographed. The data obtained were analyzed & compared.

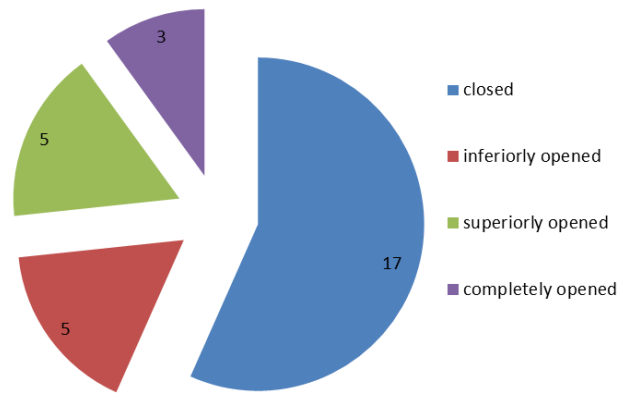
### 3. Observation and Results

In our study we found the presence of Brocq & Mouchet triangle in all the 30 cadaveric hearts. The triangle was closed in 17 cadaveric hearts (56.66%)(Figure 6). It was opened inferiorly (Figure 3) & superiorly(Figure 5) in 5 cadaveric hearts (16.66%) each. The triangle was opened completely in rest of 3 cadaveric hearts (10%) (Figure 4).

### 4. Discussion

Heart is a highly differentiated blood vessel and coronary vessels are its vasa vasorum. 2 At 5th week, blood islands appear in the sulci under epicardium.

According to Ogden theory, proximal and distal ring of capillaries develop around bulbous cordis. Distal retiform network forms a peritruncal ring, the tubular



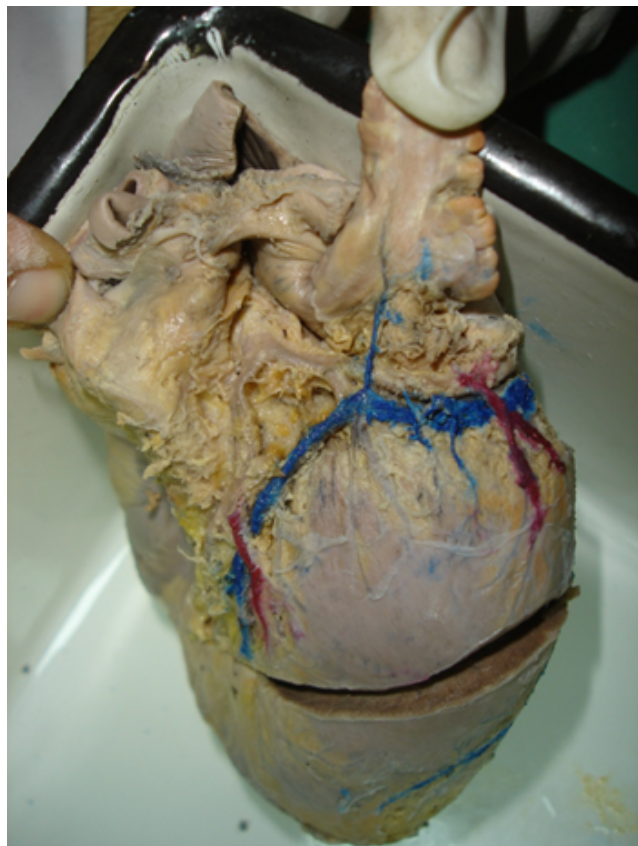
**Fig. 2:** Pie diagram showing distribution of triangles



**Fig. 3:** Inferiorly opened Brocq & Mouchet triangle



**Fig. 4:** Completely opened Brocq & Mouchet triangle



**Fig. 5:** Superiorly opened Brocq & Mouchet triangle



**Fig. 6:** Closed Brocq & Mouchet triangle

channels open towards ventricles. There is further controlled invasion into influence of VEGF and FGF1. Variations in the branching pattern of coronary

arteries are attributed to the complexity and dynamicity of coronary vessels during development.<sup>6</sup>

In our study we found the presence of Brocq & Mouchet triangle in all (100%) the 30 cadaveric hearts but the triangle was closed in 17 cadaveric hearts (56.66%). The triangle was opened in 13 cadaveric hearts (43.33%). It was opened inferiorly & superiorly in 5 cadaveric hearts (16.66%) each and the triangle was opened completely in rest of 3 cadaveric hearts (10%).

Yao Zuobin et al found a vascular triangle of Brocq & Mouchet in 96.7% hearts<sup>7</sup> which is near to our study.

Ortale J.R. et al observed that the great cardiac vein formed the base of Brocq & Mouchet triangle with the bifurcating branches of the left coronary artery in 89% of specimens.<sup>8</sup> They also found that arteriovenous triangle closed in 18%, completely opened in 15%, inferiorly opened in 64% and superiorly opened in 3%.

Andrade et al (2010) found Brocq & Mouchet triangle in 20 hearts out of 23 hearts. The pattern of distribution as follows: “closed” in 5(21.7%) hearts, “inferiorly open” in 9 (39.1%) hearts, “superiorly open” in 2 (8.7%) hearts and “completely opened” in 4 (17.4%)<sup>9</sup> which is quite similar to our study.

M.Kaczmarek et al (2007) has reported that Brocq & Mouchet triangle was created by great cardiac vein. In 73% of the cases examined the triangle was open at the right lower end, in 7% if the cases examined the triangle was open completely, in 3% the triangle was open at the left lower end, & in 17% the triangle was closed.<sup>10</sup>

We found that the triangle was closed in 56.66%. The triangle was opened in 43.33%. It was opened inferiorly & superiorly in 16.66% each and the triangle was opened completely in 10%.

Luis E Ballesteros et al (2010) found arterio-venous trigone of the heart was present in 58.8%.<sup>11</sup> While we found arterio-venous triangle is present in all hearts.

Our study may add important information to the anatomy of the heart.

## 5. Conclusion

The above data may have relevant implications regarding to procedures in the heart. The clinical importance of above triangle is for percutaneous in situ coronary venous arterialization (PICVA).

The triangle of Brocq and Mouchet is commonly used when performing an intravascular ultrasound of coronary arteries to help in identifying pericardium, myocardium and vessels in the neighborhood. Variations of this triangle may have implications in detecting those structures by ultrasonography.

## 6. Conflict of Interest

None.

## 7. Source of Funding

None.

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