

Systematic Nomenclature of Heart Valve Commissures and Annulus*

Kalp Kapak Komissürlerinin ve Annuluslarının Sistemik Adlandırılması

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ABSTRACT

Background: Several nomenclatures have been defined for easier understanding of cardiovascular anatomical structures. The “Erin commissure and annulus nomenclature” we have developed, aims to name the commissures and annulus of the valves in a certain order.

Methods: We renamed the commissures and parts of annulus in a clockwise fashion. We named the commissure, closest to the first surgeon as C1 in all heart valves. Latter commissures are named as C2 and C3 in clockwise fashion. In our naming system, the commissures in aortic, pulmonary and tricuspid valves are named as C1, C2 and C3 and the commissures in mitral valve are named as C1 and C2. We divide the annulus into zones. Each zone is the part of the annulus between two commissures. Zones are named clockwise with reference to C1 commissure as the starting point. These zones are defined as Z1, Z2 and Z3 in aortic, pulmonary and tricuspid valves and Z1 and Z2 in mitral valve.

Results: All of the heart valvular commissures and parts of the annulus even the congenital valves are named.

Conclusion: The new nomenclature will facilitate learning of topographic anatomy in surgical training. It will provide technical convenience in communication during valve surgery.

Keywords: Commissure, Annulus, Classification, Zone

ÖZ

Amaç: Kardiyovasküler hastalıkların ve anatomik yapıların daha kolay anlaşılabilmesi için birtakım adlandırılmalar tanımlanmıştır. Geliştirdiğimiz “Erin komissür ve annulus sınıflandırması” kapakların komissürlerini ve annuluslarını belirli bir düzen içerisinde sınıflandırmayı amaçlamaktadır.

Yöntem: Sınıflandırmamızda birinci cerrah pozisyonundaki cerraha en yakın komissür, tüm kapaklarda C1 olarak adlandırıldı. Daha sonra gelen komissürler, saat yönünde C2 ve C3 olarak adlandırıldı. Bu şekildeki sınıflandırmada aort, pulmoner ve trikuspid kapaktaki komissürler, C1, C2 ve C3 mitral kapaktaki komissürler ise C1 ve C2 olarak adlandırıldı. Kapak annulusları da ‘Zon’ terimiyle tanımlandı. Bu zonlar, komissürel sınıflamaya benzer şekilde birinci cerrahın operasyonda durduğu pozisyonda saat yönünde aort, trikuspid ve pulmoner annulusları başlangıç noktalarındaki C1 komissürü referans alınarak Z1, Z2 ve Z3, mitral kapak annulusu ise Z1 ve Z2 olarak tanımlandı.

Bulgular: Doğuştan bozuk olanlar da dahil olmak üzere tüm kalp kapak komissürleri ve annulusları yeniden adlandırıldı.

Sonuç: Yeni sınıflama, cerrahi eğitimde topografik anatominin öğrenilmesini ve öğretilmesini kolaylaştıracaktır. Son yıllarda artış gösteren perkütan cerrahi malzemelerin kapak annulusuna uygulanması esnasında iletişim dilinde teknik kolaylık sağlayacaktır.

Anahtar Kelimeler: Kommissür, Anulus, Klasifikasyon, Zon

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Introduction

Medical terminology helps healthcare professionals to communicate easily and precisely. This terminology is jargon that has no connotations and therefore does not allow misunderstandings, and also excludes people who are not from the field.¹ Medical terminology abbreviations include medical classification (nomenclature), partial name (acronym) and person names (eponym).² In our study, we defined a new nomenclature for the commissures and annulus of the valves in a certain order. The anatomical terminology is a base for medical communication. It is elaborated into a nomenclature in Latin. Its history goes back to 1895, when the first Latin anatomical nomenclature was published as *Basiliensia Nomina Anatomica*. It was followed by seven revisions (*Jenaisia Nomina Anatomica 1935*, *Parisiensia Nomina Anatomica 1955*, *Nomina Anatomica 2nd to 6th edition 1960–1989*). The last revision *Terminologia Anatomica* is highly recommended to the attention of not only teachers, students and researchers, but also to clinicians, doctors, translators, editors and publishers to be followed in their activities.³

Andreas Vesalius (1514-1564) takes his place in the history of science of our planet as the scientist who took the first steps of modern anatomy and over it, of modern medicine in terms of approach and method. New nomenclatures are needed in the historical process after this valuable scientist. This nomenclature facilitates learning of valve anatomy, ensure communication among health professionals and a methodological approach. Over the centuries, anatomists developed a standard nomenclature, or method of naming anatomical structures. Terms such as "up" or "down" obviously have no meaning unless the orientation of the body is clear. When a body is lying on its back, the thorax and abdomen are at the same level. Our nomenclature on valve commissures and annulus is a first in the literature, because it aims to suggest names to the unclassified parts of the valves.

Methods

This new nomenclature was named as 'Erin commissure and annulus nomenclature'.

Commissures: Simply defined, the commissure closest to the first surgeon position was called as C1 in all valves. The other commissures were called as C2 and C3 clockwise, respectively. In this classification, there will be C1, C2 and C3 commissures in the aortic, pulmonary and tricuspid valves, and C1 and C2 commissures in the mitral valve.

Annulus and Zones: To simplify the naming of the parts of annulus, annulus was divided into zones according to neighboring commissures. Each part of annulus between two commissures were named as zones. Similar to the commissural classification, these zones were defined as Z1, Z2 and Z3 in the aortic, pulmonary and tricuspid valves, and Z1 and Z2 in the mitral valve. Zones are named clockwise with reference to the C1 commissure as the starting point.

Results

The new equivalents of the old definition are explained below:

Commissures of Aortic Valve:

Noncoronary-left coronary commissure: C1

Right-left coronary commissure: C2

Noncoronary-right coronary commissure: C3

Zones of Aortic Valve Annulus:

C1-C2: Z1

C2-C3: Z2

C3-C1: Z3

Commissures of Tricuspid Valve:

Postero-septal commissure: C1

Antero-septal commissure: C2

Antero-posterior commissure: C3

Zones of Tricuspid Valve Annulus:

C1-C2: Z1

C2-C3: Z2

C3-C1: Z3

Commissures of Mitral Valve:

Posteromedial commissure: C1

Anterolateral commissure: C2

Zones of Mitral Valve Annulus:

C1-C2: Z1

C2-C1: Z2

Commissures of Pulmonary Valve

Left leaflet - right leaflet: C1

Left leaflet -anterior leaflet: C2

Anterior leaflet -Right leaflet: C3

Zones of Pulmonary Valve Annulus:

C1-C2: Z1

C2-C3: Z2

C3-C1: Z3

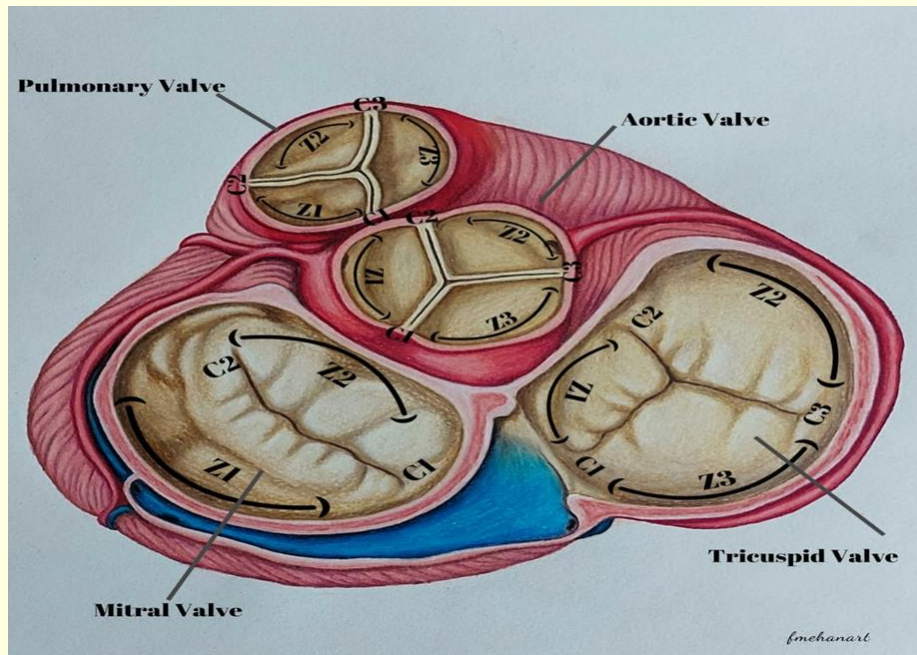


Figure 1. Commissures and zones

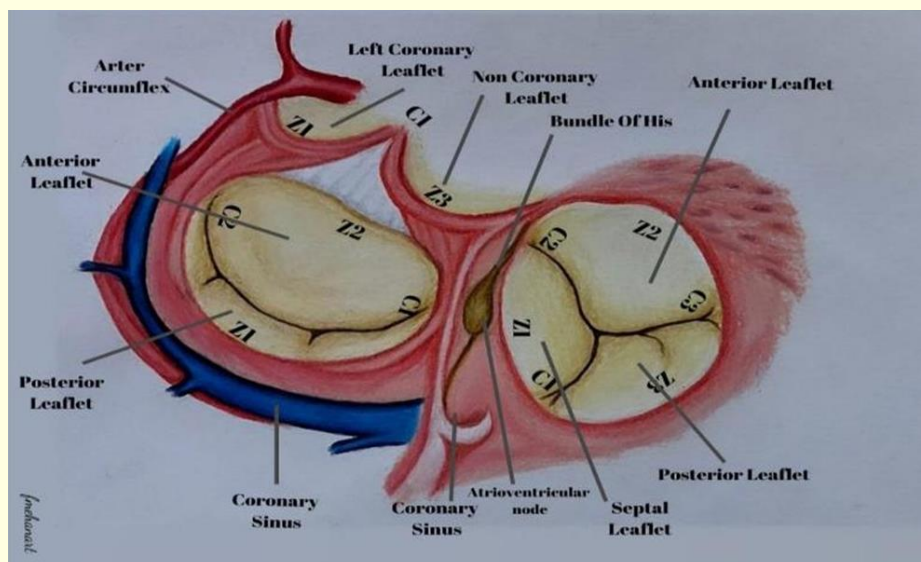


Figure 2. Surgical neighborhood of commissures and zones

Discussion

Knowing the anatomy of the heart valve and distinguishing the safe and risky areas in the suture lines are important for the success of heart valve surgeries. Some classifications are used in order to understand and correctly apply surgical techniques. The functional classification of mitral valve disease was made by Carpentier⁴. Carpentier divided the anterior and posterior valves of the mitral valve into A1-P1, A2-P2 and A3-P3 segments to facilitate surgical techniques to protect the mitral valve⁵. However, there is no systematic nomenclature in the literature for naming the commissures and annulus of the heart valves. The commissures are named according to the two adjacent leaflets in the tricuspid valve, such as postero-septal, antero-septal, antero-posterior. In the aortic valve, the valves are defined as right, left and noncoronary according to the origin of the coronary arteries.

Aortic valve commissures are called noncoronary-left coronary, right-left coronary or noncoronary-right coronary commissures. Mitral valve commissures, on the other hand, are called posteromedial and

anterolateral.⁶ The new classification will facilitate learning in surgical education and will provide an easier understanding of topographic anatomy. In addition, during the application of surgical materials to the valve, it will provide technical convenience in communication.

Current nomenclature can not define congenital valve malformations such as quadricuspid aortic valve which is a rare congenital heart defect characterized by the presence of four cusps, instead of the usual three found normally in the aortic valve. However, in our nomenclature fourth cusp will be called as C4 and annulus part between C3 and C4 will be called as Z4.

The disadvantage of our naming is that it does not define subvalvular apparatus.

Conclusions

We believe that our nomenclature will provide ease of learning for surgeons trained in this field and will help simplify the communication language between physicians.

Abbreviations:

C: Commissure

Z: Zone

A: Anterior

P: Posterior

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Author Contributions

Mehmet Erin Tüysüz: Idea/concept, design, control/supervision, article writing, critical review.

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Ali Gül: Analysis or interpretation, article writing, critical review.

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