



Correspondence

A guide for Gensini Score calculation



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To the Editor,

We have read with great interest the recent article by Wang et al. [1], in which the researchers investigate the effects of leukocyte telomere length and mitochondrial DNA copy number, alone or in combination, on coronary artery disease (CAD) risk and severity in the Chinese population. As reported by the authors, the angiographic burden of CAD was quantified by the modified Gensini Score.

Gensini Score (GS) is a widely used angiographic scoring system [2] for quantifying the severity of CAD, and was first described in 1975 by Goffredo G. Gensini [3]. The GS has been developed to characterize the complexity of CAD taking into consideration 3 main parameters for each coronary lesion: severity score, region multiplying factor and collateral adjustment factor [3,4].

In particular, a lesion is defined as significant when it causes $\geq 1\%$ reduction in luminal diameter by visual assessment. The relative severity of the lesion is indicated using a score of 1 for 1–25% obstruction and doubling that number as the severity of obstructions progresses with each step in the 25–50–75–90–99–100% diameter reduction (Fig. 1), taking into consideration that the impact on flow doubles in accordance with Poiseuille's law. Thus, the severity score for each lesion may range

from 1 to 32. Furthermore, the GS weighed according to the usual blood flow to the left ventricle in each vessel or vessel segment, with distinction between right and left dominant coronary system. A multiplying factor is applied to each lesion score based upon its location in the coronary tree, depending on the functional significance of the area supplied by that segment (Fig. 1). If a segment is totally occluded or 99% stenosed and receiving collaterals, a collateral adjustment factor is used, and the adjustment is reduced by the extent of disease in the vessel that is the source of collaterals (Fig. 1). The final GS is the sum of all the lesion scores (an example is given in Fig. 2).

However, during the extensive review of the literature, as also in the abovementioned article [1], we noticed that only 2 of the 3 parameters are used for score calculation. In the vast majority of the relevant articles, GS has been calculated taking into consideration only 2 factors for each lesion (the severity score and the region multiplying factor), without considering an additional third parameter, the modifying influence of the collaterals with the severity score adjustment factor. As a result, the complexity of CAD when determined by the GS is overestimated in patients with collateralized total occluded coronary arteries.

STEP 1 Calculation of the severity score for each lesion $\geq 25\%$ and adjustment for total occlusions or 99% obstructive lesions receiving collaterals			
Degree of stenosis (%)	Receiving collaterals	Adjustment for collaterals	Severity Score
1-25	-	0	1
26-50	-	0	2
51-75	-	0	4
76-90	-	0	8
91-99	no	0	16
99	yes	-8	8
100	no	0	32
100	yes, and normal source vessel	-16	32-16=16
100	yes, and 25% stenosis source vessel	-12	32-12=20
100	yes, and 50% stenosis source vessel	-8	32-8=24
100	yes, and 75% stenosis source vessel	-4	32-4=28
100	yes, and 90% stenosis source vessel	-2	32-2=30
100	yes, and 99% stenosis source vessel	-1	32-1=31

STEP 2 A multiplying factor is applied to each lesion score based upon its location in the coronary tree		
Segment	Right Dominance	Left Dominance
RCA proximal	1	1
RCA mid	1	1
RCA distal	1	1
PDA	1	1
PLB	0.5	0.5
Left Main	5	5
LAD proximal	2.5	2.5
LAD mid	1.5	1.5
LAD apical	1	1
1 st Diagonal	1	1
2 nd Diagonal	0.5	0.5
LCx proximal	2.5	3.5
LCx mid	1	2
LCx distal	1	2
Obtuse Marginal	1	1

STEP 3 Sum of all the lesion severity scores		
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Fig. 1. Step by step algorithm for the Gensini Score calculation.

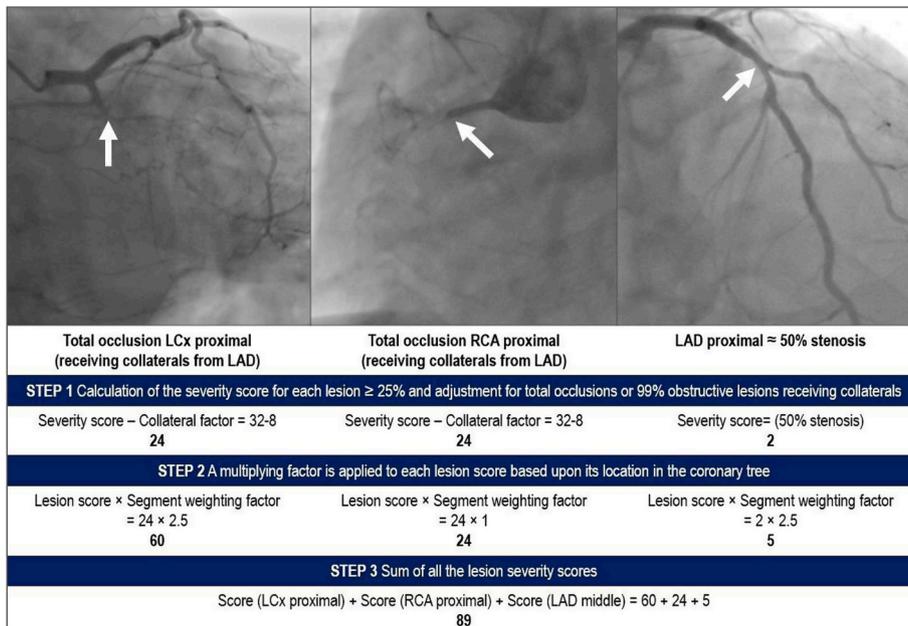


Fig. 2. An example of Gensini Score calculation for a patient with 2 total occluded coronary arteries both receiving collaterals from LAD.

Conflict of interest

The authors declared they do not have anything to disclose regarding conflict of interest with respect to this manuscript.

References

- [1] X. Wang, N. Cui, S. Zhang, Z. Liu, J. Ma, L. Ming, Leukocyte Telomere Length, Mitochondrial DNA Copy Number, and Coronary Artery Disease Risk and Severity: A Two-Stage Case-Control Study of 3064 Chinese Subjects, *Atherosclerosis*, 2019.
- [2] L.J. Neeland, R.S. Patel, P. Eshtehardi, S. Dhawan, M.C. McDaniel, S.T. Rab, et al.,

- Coronary angiographic scoring systems: an evaluation of their equivalence and validity, *Am. Heart J.* 164 (2012) 547–552 e1.
- [3] G.G. Gensini, *Coronary Arteriography*, (1975).
- [4] G.G. Gensini, A more meaningful scoring system for determining the severity of coronary heart disease, *Am. J. Cardiol.* 51 (1983) 606.

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