

## Exploring the Potential of Earlobe Crease as an Indicator of Coronary Artery Disease Risk: A Preliminary Case Study in Nepal

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### Abstract

#### Background

Cardiovascular diseases are the leading cause of death worldwide. Frank's sign, also called diagonal earlobe crease (DELC), is an emerging physical finding that has been linked with the risk and severity of coronary artery disease (CAD). Such finding serves a utile purpose with a diagnostic value for detection of CAD.

#### Objective

Frank's sign could be used as a potential indicator of risk for CAD that could be explored while examining the patients for their early diagnosis and treatment in resource-limited setting.

#### Finding

We encountered with a 71-year-old individual displaying Frank's sign, with a history of smoking, chronic alcohol consumption and hypertension, predisposing him to coronary artery disease (CAD). Frank's sign gained attention for its association with angina pectoris, electrocardiographic ischemic changes, and coronary artery disease soon after the discovery from 1973. Since then, many researchers have emphasized on the grandness of DELC in espial of CAD.

#### Conclusion

Frank sign or DELC can be used as a simple, convenient and effective physical finding for earlier discovery and treatment of CAD.

### 1. Introduction

The detection of easily observable physical signs linked to heightened cardiovascular disease risk has sparked considerable interest in recent years. Such nuanced details can prove invaluable in resource-limited settings for assessing a patient's susceptibility to cardiovascular conditions. One such indicator is the earlobe crease (ELC), characterized by a diagonal wrinkle traversing the earlobe from tragus to the auricle [1]. Initially described in 1973, ELC also referred as Frank's sign has emerged as a marker of cardiovascular diseases, encompassing coronary, cerebrovascular, and peripheral vascular diseases, particularly among individuals under 60 years old [2,3].

Historical accounts suggest that the Roman emperor Hadrian succumbed to congestive heart failure resulting from hypertension

and coronary atherosclerosis [4]. This diagnosis finds support in the identification of bilateral diagonal ear creases on sculptures of several busts of Hadrian, along with literary evidence of behaviour patterns [4].

Research has proposed a potential association between ELC and CAD, perhaps due to shared pathophysiological mechanisms such as atherosclerosis and microvascular dysfunction [5]. Other hypotheses propose vascular changes linked to oxidative stress and reduced blood supply [6]. The severity of the sign, determined by its length, depth, bilateral nature, and inclination, correlates with the incidence of cardiovascular events [7]. A study by Shoenfeld et al. revealed a diffuse arrangement of elastic fibres in biopsy specimens from DELC, akin to the morphology present in diseased hearts [8].

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Comparing the results of these studies is complex due to associations with a range of modifiable and non-modifiable cardiovascular risk factors. However, one study, addressing these concerns, found that the presence of an ELC independently correlated with a 40% increased risk of acute myocardial infarction (AMI) in the general population while another suggested a 72% prevalence of cardiovascular disease [9,10]. Some studies propose that it may serve as a reminder for optimal metabolic control and attention to other cardiovascular risk factors in diabetes management [11].

Therefore, this case report aims to enrich existing literature by presenting a case of CAD in a patient with an ELC, underlining the significance of recognizing this subtle physical finding in clinical practice in poor resource settings of Nepal.

## 2. Case Presentation

A 71-year-old male unfolds with his presentation at the emergency department for dialysis due to Acute Kidney Disease. He had a past medical history of Diabetes Mellitus for the past eight years and Hypertension for the past year, for which he had been on regular medication. Additionally, the patient had a significant history of chronic smoking (50 pack years) and alcohol consumption (100-500ml homemade alcohol for the last 20 years). Four years prior, he was admitted for a lateral myocardial infarction (MI). His Coronary Angiogram (CA) revealed 100% stenosis in the Obtuse Marginal-2 (OM2) of the Left Circumflex (LCX) artery, as well as plaques in the mid Left Anterior Descending (LAD) artery, mid Right Coronary Artery (RCA), and Posterior Left Ventricular (PLV) artery. Subsequently, he underwent Coronary Artery Bypass Graft (CABG) and was discharged with essential medications.

Four days prior to the current presentation, the patient presented to a tertiary cardiac facility with complaints of profuse sweating, frequent episodes of dizziness, and an episode of loss of consciousness. He was diagnosed with an inferolateral MI, with CA revealing 100% stenosis in the RCA and 60% stenosis in the LCX. He underwent Primary Per-Cutaneous Intervention (PPCI) to the RCA. After an uneventful procedure, he developed Acute Kidney Injury (AKI), necessitating dialysis, which prompted him to seek further care at the tertiary care facility.

Upon presentation, the patient complained of shortness of breath over the past five days, characterized by a sudden onset, worsening with exertion, and alleviation with rest. He denied experiencing fever, abdominal pain, dizziness, headache, cough, or visual disturbances. He was being treated with aspirin 150mg and clopidogrel 75mg orally once daily for antiplatelet therapy, furosemide 40mg orally twice daily for fluid balance and regular insulin to control blood sugar levels.

On initial evaluation in the emergency room, the patient's vital signs were stable, indicating no acute distress. However, physical examination revealed several significant findings. Bilateral Frank

sign could be appreciated, suggesting a potential association with cardiovascular disease. Distended jugular veins were observed, indicating elevated central venous pressure. Auscultation of the chest revealed wheezing with no crackles, suggesting underlying respiratory pathology. There were no murmurs, cardiac rubs, or gallops appreciated upon cardiac auscultation. Palpation of the chest wall revealed no tenderness, and there was no evidence of facial swelling and edema of lower extremities.

Given the complexity of his presentation and the need for urgent intervention, the patient was promptly admitted to the intensive care unit (ICU) for further management. Emergency dialysis was initiated to address his acute kidney injury and manage his fluid status. Further investigations and treatment planning were undertaken to comprehensively address his cardiovascular disease, respiratory symptoms, and underlying comorbidities.

## 3. Discussion

In our case report, the 71-year-old individual with a history of smoking, chronic alcohol consumption, and multiple comorbidities, predisposing him to coronary heart disease (CHD). Despite regular dialysis and follow-up, they experienced a myocardial infarction. We propose that integrating the assessment of a simple diagnostic tool, the diagonal earlobe crease, could enhance risk assessment for CHD in similar patient populations. Identifying this sign might facilitate the earlier initiation of prophylactic therapy, potentially mitigating the morbidity associated with CHD.

Introduced by pulmonologist Saunders T. Frank in 1973, Frank's sign gained attention for its association with angina pectoris, electrocardiographic ischemic changes, and coronary artery disease. Subsequent research confirmed a significant statistical association between Frank's sign and coronary artery disease, highlighting its diagnostic value [2].

The pathophysiology of Frank's sign has been linked to poor blood supply in the arteries supplying the earlobes. Research by Shoenfeld et al. observed a diffuse arrangement of elastic fibers in biopsy specimens from DELC, similar to morphology present in diseased heart tissue. Additionally, a study on the Japanese population with metabolic syndrome found an association between DELC and telomere shortening, indicating accelerated aging and atherosclerosis [8].

The significance of Frank's sign, in cardiovascular disease (CVD) has been extensively studied. Lakshmi M U and P.S.N Murthy conducted a study revealing a high prevalence of DELC in patients with CVD, suggesting its potential as a screening tool for diagnosis and prevention of CVD. They found that DELC is associated with the severity of coronary artery disease (CAD) and ischemic stroke, independent of traditional risk factors such as serum lipids and diabetes mellitus [10].

Bogun L. V et al. described DELC as a strong independent risk factor for CAD and sudden cardiac death, alongside age and body mass index, corroborating findings from ancient Roman and Chinese scriptures [12]. Additionally, a study by Aligisakis et al. demonstrated a significant presence of earlobe creases in a large population, underlining its importance as a simple clinical sign for risk assessment [13].

These studies collectively underscore the clinical significance of Frank's sign in the diagnosis and prognosis of cardiovascular diseases, echoing the potential utility suggested by our case report.



**Figure 1:** Diagonal ear lobe crease seen in 71 year of patient with cardiovascular disease

#### 4. Conclusion

Based on our finding and the literatures, despite the diagnostic accuracy of CAD are available, DELC can help physician in early suspicion as a simple, easy and expedient screening marker for CAD mostly in resource-limited settings. Frank's sign can also help primary practitioners to predict severity of CAD.

#### References

1. Agouridis, A. P., Elisaf, M. S., Nair, D. R., & Mikhailidis, D. (2015). Ear lobe crease: a marker of coronary artery disease?. *Archives of Medical Science*, *11*(6), 1145-1155. <https://www.termedia.pl/Journal/-19/pdf-26361-10?filename=ear%20lobe.pdf>
2. Frank, S. T. (1973). Aural sign of coronary artery disease.:
3. Baboujian, A., Bezwada, P., & Ayala-Rodriguez, C. (2019). Diagonal Earlobe Crease, a Marker of Coronary Artery Disease: A Case Report on Frank's Sign. *Cureus*, *11*(3).
4. Henrina, J., Teresa, M., Wiraatmadja, A., Purnama, A., & Cahyadi, A. (2023). Inferoposterior ST-Elevation Myocardial Infarction in a Patient with Frank's Sign: A Case Report. *Pakistan Heart Journal*, *56*(1), 120-123.
5. Sasaki, O., Nishioka, T., & Sasaki, H. (2023). Earlobe creases as a marker of the risk for coronary atherosclerosis before angiography in elderly and non-elderly patients. *Cureus*, *15*(3).
6. Koyama, T., Watanabe, H., & Ito, H. (2016). The association of circulating inflammatory and oxidative stress biomarker levels with diagonal earlobe crease in patients with atherosclerotic diseases. *Journal of cardiology*, *67*(4), 347-351.
7. Rodríguez-López, C., Garlito-Díaz, H., Madroñero-Mariscal, R., Sánchez-Cervilla, P. J., Graciani, A., López-Sendón, J. L., & López-de-Sá, E. (2015). Earlobe crease shapes and cardiovascular events. *The American journal of cardiology*, *116*(2), 286-293.
8. Shoenfeld, Y., Mor, R., Weinberger, A., Avidor, I., & Pinkhas, J. (1980). Diagonal ear lobe crease and coronary risk factors. *Journal of the American Geriatrics Society*, *28*(4), 184-187.
9. Davis, T. M. E., Balme, M., Jackson, D., Stuccio, G., & Bruce, D. G. (2000). The diagonal ear lobe crease (Frank's sign) is not associated with coronary artery disease or retinopathy in type 2 diabetes: the Fremantle Diabetes Study. *Australian and New Zealand journal of medicine*, *30*(5), 573-577.
10. Lakshmi, M. U., & Murthy, P. S. N. (2021). Evaluation of diagonal earlobe crease (Frank's sign) as a noninvasive marker of cardiovascular diseases.
11. Kang, E. H., & Kang, H. C. (2012). Association between earlobe crease and the metabolic syndrome in a cross-sectional study. *Epidemiology and Health*, *34*.
12. Bogun, L. V., Ivleva, O. O., & Okhryamkina, O. O. (2017). Diagonal earlobe crease: frank's sign in ischemic heart disease. *Вестник Харьковського національного університету імені В.Н. Каразіна. Серія «Медицина»*, (34), 57-62.
13. Aligisakis, M., Marques-Vidal, P., Guessous, I., & Vollenweider, P. (2016). Did Dumbo suffer a heart attack? Independent association between earlobe crease and cardiovascular disease. *BMC cardiovascular disorders*, *16*, 1-9.

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