Case Report: Apical Hypertrophic Cardiomyopathy of an elite athlete in the Hong Kong Sports Institute

Bryan Lau
NUTRITIONAL SUPPLEMENT CLINICALLY PROVEN TO HELP IMPROVE STRENGTH & IMMUNITY

- HMB to help modulate protein turnover and muscle breakdown
- Complete, balanced nutrition with multiple nutrients to support immune health

REDUCE4 Inflammation
NORMAL MUSCLE
PROTECT4 Against Muscle Breakdown
PROMOTE** Muscle Health

SUPPORT IMMUNE FUNCTION
SUPPORT SUPPLY IMMUNE FUEL FOR IMMUNE CELLS
SUSTAIN TISSUE HEALTH WITH NUTRIENTS TO HELP

SHIELD Strengthening health in elderly solely through nutrition

A large-scale double-blinded, randomized, placebo-controlled clinical study of a complete balanced nutrition supplement with HMB on the CLINICAL, NUTRITIONAL & FUNCTIONAL OUTCOMES

*Conducted as the Nutritional Health of the Elderly Reference Group (NUTREO) in Singapore on 477 community-dwelling older persons aged 65 years and above who were at risk of undernutrition, using a nutrition supplement with 3.7g CaHMB™ and 15g protein powder.

**Ensures are a registered trademark of Abbott Laboratories.

Significantly higher leg strength at day 90

<table>
<thead>
<tr>
<th>Group</th>
<th>Leg Strength (Kg)</th>
<th>Significant Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo</td>
<td>10.9</td>
<td>12.2</td>
</tr>
<tr>
<td>Intervention</td>
<td>13.0</td>
<td>14.7</td>
</tr>
</tbody>
</table>

Significantly higher handgrip strength at day 180

<table>
<thead>
<tr>
<th>Group</th>
<th>Handgrip Strength (Kg)</th>
<th>Significant Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo</td>
<td>13.7</td>
<td>14.6</td>
</tr>
<tr>
<td>Intervention</td>
<td>15.7</td>
<td>17.3</td>
</tr>
</tbody>
</table>

Ensure® NutriVigor (2 servings/day) contains:

- 3g CaHMB™
  Increase lean body mass to improve muscle strength and quality
- 6.4 mcg Vitamin D + 512mg Calcium
  Support muscle and bone function
- Vitamin D to help activate and regulate immune system cell function
- 17g Protein
  Help with muscle tissue building and growth

For healthcare professional reference only.
CASE REPORT

Case Report: Apical Hypertrophic Cardiomyopathy of an Elite Athlete in the Hong Kong Sports Institute

Bryan Lau Siu Fung

Hong Kong Sports Institute Clinic, Hong Kong, China

Abstract

This case report is about an elite athlete in the Hong Kong Sports Institute who was diagnosed apical hypertrophic cardiomyopathy through periodic medical assessment with history taking, physical examination, 12-lead resting ECG and subsequent imaging investigations. The challenge of differentiating pathological condition from physiological adaptation of an athlete with electrocardiographic changes was solved by using the latest international consensus which was advanced by new emerging research data.

Keywords: Sports cardiology, ECG interpretation in athletes, Apical hypertrophic cardiomyopathy

Introduction

One of the essential elements of Periodic Medical Assessment of Elite Athletes is the cardiological screening. For many years, Sports Cardiologists and Sports Physicians have screened elite athletes with the aim of identifying, and hence reducing the risk for sudden cardiac death. The commonly used screening methods include history taking, physical examination and 12-leads resting electrocardiogram (ECG). This case report is about the medical screening of an elite athlete in the Hong Kong Sports Institute (HKSI) during 2020–2022, demonstrating how the periodic health screening works to diagnose the congenital heart condition, apical hypertrophic cardiomyopathy, which is not favorable for elite level of training and competition.

12-lead resting ECG's were performed and interpreted with 'International criteria for electrocardiographic interpretation in athletes: Consensus statement in 2017', for all scholarship athletes in the Hong Kong Sports Institute since year 2019 [1].

Case Report

Athlete A was a full-time cardio-demanding elite athlete representing HKSAR for more than a decade. He enjoyed good past health with negative family history of congenital heart disease or sudden unexplained death at the early age. He was asymptomatic when he underwent the Periodic Medical Assessment in HKSI in January 2020. However, there was an incidental finding of 12-lead resting ECG during the medical assessment, showing T-wave inversion in the inferior leads and satisfying voltage criteria for left ventricular hypertrophy (Fig. 1). Subsequent examinations including treadmill stress test and transthoracic echocardiogram were done by a Cardiologist. The overall impression was a nondiagnostic stress test, with good exercise tolerance and more ST depression on exercise. Echocardiogram showed normal left and right ventricular systolic function and size, with mildly increased LAV/LVEDV index which was likely training related and within the recognized limits in athletes (Fig. 2). From the Cardiologist's
Fig. 1. 12-lead resting ECG of Athlete A in year 2020 with T-wave inversion in the inferior leads and voltage criteria of left ventricular hypertrophy satisfied.

Fig. 2. Transthoracic echocardiogram of Athlete A in year 2020 with mildly increase LAV/LVEDV index and normal left and right ventricular systolic function and size.
comment, there was no contra-indication to continue exercise and a repeated echocardiogram was suggested in two years.

In March 2022, he underwent another 12-lead resting ECG for the annual medical check-up when he was going to compete overseas. He was asymptomatic but the resting ECG showed new abnormal findings of widespread T-wave inversions and ST depression in the lateral leads which warranted early Cardiologist consultation (Fig. 3). Cardiac MRI was done in the United Kingdom (UK), confirming characteristic phenotype of apical hypertrophic cardiomyopathy with a maximal wall thickness of 15 mm, along with evidence of ischemia in the hypertrophied segments in the apex and some scarring as well. The Cardiologist in UK hence recommended that he could not continue to play competitive sports as the condition is generally considered to be a disqualifying condition in competitive sports.

He then came back to Hong Kong for second opinion from a Cardiologist locally. All subsequent investigations performed in Hong Kong, including the repeat cardiac MRI (Fig. 4), was consistent with the investigation findings and diagnosis made in UK, which would disqualify him from competitive sports.

While the data on the natural history of apical hypertrophic cardiomyopathy in the local population is far from clear, further risk assessment did not indicate that an implantable cardioverter defibrillator was necessary (AHA risk estimate, <2% risk of arrhythmic death per year). Beta-blocker (Metoprolol succinate 25 mg po daily) was started to reduce the burden of ventricular ectopic beats (3.5%) and any remote risk of arrhythmia, though treadmill stress test and long-term ambulatory ECG patch monitoring did not find any ventricular tachycardia or other arrhythmias.

Athlete A's annual medical screening in HKSI was therefore not passed in year 2022.

Discussion

Sudden cardiac death is the leading cause of mortality in athletes during sports [2–4]. Although the majority of the hereditary, structural, or electrical cardiac disorders associated with sudden
cardiac death can be suggested by abnormalities on a non-invasive investigation of 12-lead resting ECG, it was challenging to identify potentially fatal heart disease of elite athletes using the standard interpretation criteria. The high false-positive rate of resting ECG will result due to physiological adaptations in athletes.

The standards for ECG interpretation in athletes have evolved quickly since year 2010, advanced by new emerging research data that examine proposed criteria sets and establish new evidence to guide refinement. ‘International criteria for electrocardiographic interpretation in athletes: Consensus statement in 2017’ is now popularly used among the physicians worldwide to interpret athletes’ ECG, which provides expert opinion-based recommendations linking specific ECG abnormalities and the evaluation for conditions associated with sudden cardiac death.

Apart from the application of latest advancement in ECG interpretation standards, the sensitivity to establish the diagnosis of a potentially fatal heart disorder in athletes could be also enhanced by follow-up imaging investigations and periodic cardiac screening with 12-lead resting ECG, especially for those cardiac disorders which are relatively marginal in terms of the clinical presentation phenotypically.

The data of apical hypertrophic cardiomyopathy is highly limited, not to mention the clinical implication for the Asian population. Same as some other congenital heart conditions, it could remain silent for many years from health screenings, using resting ECG and more advanced investigations such as echocardiogram.

In conclusion, although the findings of 12-lead resting ECG are not specific for diagnosing cardiac disorders associated with sudden cardiac death; it could serve well as an effective screening investigation tool for the elite athletes, if using the latest international consensus about the interpretation of athletic ECG in a reasonable periodic interval.

Funding
None declared.

Conflict of interest
No conflict of interest.

Ethical information
Not applicable.

References