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In exercise of the powers conferred by Rule 39B and 133A of the Aircraft Rules, 1937, the following requirements are hereby issued for information, guidance and compliance.

(H.S. KHOLA)
Director General of Civil Aviation

File No.Air HQ/26115/11/MED-9

Subject: DISPOSAL OF CASES OF ISCHAEMIC HEART DISEASE.

1. In the light of recent advances in our knowledge of coronary artery disease, its management and prognosis, and our own accumulated data and experience, it has become necessary to review and revise the guidelines for the employability of aircrew with coronary artery disease (IHD). These guidelines are laid down in the following paragraphs.

2. Classification and criteria for diagnosis:

a) **IHD Asymptomatic:** ECG abnormality suggestive of IHD, detected during routine examination in an asymptomatic individual.

i) **Minimal/Insignificant coronary artery disease:** No single coronary artery lesion is greater than 50% of the diameter of the lumen. Lesions greater than 30% but less than 50% in more than one coronary artery or tandem lesion in the same artery will be assessed on case-to-case basis. A stress thallium test will be carried out if considered necessary.

ii) **Significant coronary artery disease:** Any lesion in a coronary artery with 50% or more stenosis of diameter.

b) **IHD – Angina Pectoris**

i) **Stable Angina:** Angina which is usually precipitated by exertion. There should not have been any change in frequency or duration of angina or ease of relief of anginal pain during the past 60 days or more.

ii) **Unstable Angina:** New onset angina/Angina occurring with increased frequency or duration or angina t rest.

iii) **Variante Angina (Prinzmetal angina):** Usually occurs at rest and ECG during the episode exhibits transient ST segment elevation.

- iv) **Angina with normal coronary arteries (syndrome X)** : Classical angina pectoris with normal epicardial coronary arteries as assessed by coronary angiography. Causes include inadequate vasodilator reserve, intramyocardial muscle bridges and small vessel coronary artery disease.
- c) **IHD – Myocardial Infarction**
 - i) **Non-transmural (Synonyms: Sub-endo cardiac infarction or non q wave infarction)** : Individuals showing evidence of Myocardial muscle necrosis with elevation of serum cardiac enzymes (SGOT, LDH & CPKMB) during acute phase of illness and no evidence of pathological q wave on ECG.
 - ii) **Transmural (q wave infarction)** : Individuals showing evidence of Myocardial muscle necrosis with elevation of serum cardiac enzymes during acute phase of illness and development of pathological q wave on ECG.
- d) **IHD Post PTCA/CABGS** : Cases of IHD who have undergone Myocardial revascularisation procedure.

Assessment of IHD Cases

3. Aircrew with asymptomatic IHD clinical group (a) will be referred to AFCME only for complete cardiac evaluation. The following investigations will be carried out as considered necessary:

- a) Biochemical Profile
- b) Treadmill Stress Test (TMT)
- c) Holter monitoring
- d) Echo Cardiography including Stress Echo
- e) Stress MUGA
- f) Stress Thallium Scan
- g) Coronary angiography (CART).

4. **Disposal: IHD Asymptomatic**

- a) If coronary angiography is normal and there is no associated abnormality, e.g. Hypertension, Hypertrophic Cardiomyopathy, Aortic valvular disease, Myocarditis etc. the aircrew will be certified fit.
- b) Cases with minimal/insignificant coronary artery disease will be certified fit with restriction to fly as P1 along with a qualified P2 only. All renewal medical examination will be conducted at AFCME/IAM only. These cases will undergo Stress Thallium every year. Coronary angiography may be repeated as indicated.

- c) Cases of significant coronary artery disease in whom myocardial revascularisation procedure is not indicated or not performed or who are advised only medical treatment, will be grounded. Cases requiring myocardial revascularisation procedures (PTCA/CABGS) will be disposed as indicated later.

5. **Disposal of IHD : Angina Pectoris**

- a) All cases of angina will be observed on ground for a minimum period of 12 months. Certification will be considered only after 12 months of the initial diagnosis provided the following criteria are met:
- i) Individual is asymptomatic and effort tolerance is normal.
 - ii) Modifiable risk factors and complications, if any, are under control/stabilised.
 - iii) Maximal TMT, Stress MUGA & Stress Thallium do not show evidence of reversible myocardial ischaemia.
 - iv) Holter monitoring does not reveal any episode of silent myocardial ischaemia or significant arrhythmia.
 - v) Echo shows normal left ventricular function and no significant regional wall motion abnormality.
 - vi) Not on cardioactive drugs.
 - vii) Coronary angiography and other haemodynamic studies show coronary arteries to be normal or with minimal/insignificant lesion.
- b) Such cases will be certified fit to fly as P1 along with a qualified P2 only. These cases will be followed up annually at IAM/AFCME. Stress Thallium will be repeated every year and Coronary angiography will be repeated as indicated.
- c) Aircrew with Angina Pectoris and significant coronary artery disease may be considered for upgradation provided they have undergone myocardial revascularisation procedures. Disposal of these cases will be as given later (Disposal after PTCA/CABGS).

6. **Disposal of IHD: Myocardial Infarction (Non-transmural Myocardial Infarction as well as Transmural Myocardial Infarction)** : Aircrew with Myocardial Infarction will be grounded. However, AFCME may on a case to case basis recommend cases of Myocardial Infarction for award of P1 status to fly along with a qualified P2 only (with any other specified restrictions) not less than 12 months after the initial episode provided all the following criteria are met:

- a) Individual is asymptomatic and his effort tolerance is normal.
- b) Modifiable risk factors and complications, if any, are corrected/stabilised.
- c) Maximal TMT, Stress MUGA, Stress Thallium scan do not show evidence of reversible myocardial ischaemia.
- d) Holter monitoring does not reveal any episode of silent myocardial ischaemia or significant arrhythmia.
- e) Echo shows normal LV functions and no significant regional wall motion abnormality.
- f) Not on any active cardiac drugs for last six weeks.
- g) Coronary angiography and other haemodynamic studies show coronary arteries other than the infarct related vessel to be normal or with minimal lesion and
- h) These cases will be reviewed every six months at AFCME only.

7. **Disposal after Myocardial Revascularisation Procedures** : Selected cases fulfilling the laid down criteria will be considered for certification.

a) **Percutaneous Transluminal Coronary Angioplasty (PTCA)**

- i) A minimum period of nine months should have elapsed since PTCA. He should have remained asymptomatic and maintained functional class I (MYHA) for at least 6 months.
- ii) They should not have any associated disease like Diabetes mellitus, Hypertension, Peripheral vascular disease or metabolic disorder. The modifiable risk factors should have been corrected.
- iii) There should be no evidence of significant reversible myocardial ischemia/arrhythmia/conduction defects appearing on TMT. The subject should satisfactorily complete a symptom limited exercise electrocardiographic evaluation (usually Bruce stage 3 or more).
- iv) 24 hours Ambulatory monitoring (Holter) should not reveal any significant Arrhythmia, conduction defect or silent ischaemic episode.
- v) Radionuclide Ventriculography should reveal normal ventricular size, shape and functions. Global left ventricular ejection fraction should be normal (more than or equal to 50%) showing further rise with exercise.
- vi) Repeat coronary Arteriography not earlier than 8 months following the procedure should show results of successful coronary angioplasty with no evidence of restenosis. There should be no lesion restricting the luminal diameter to 50% or more in any epicardial artery.

- vii) Planar Thallium Myocardial Perfusion Scan should reveal normal left ventricular size, absence of stress induced perfusion defect or washout abnormality in any part of myocardium.
- viii) Those cases who fulfil the above criteria will be considered fit for flying as P1 along with a qualified P2 only (with any other restriction). They will be reviewed at least once in 12 months at AFCME. Investigations including Stress Thallium and Coronary Angiography will be carried out as considered necessary by the Cardiologist of the Establishment. Cases who have suffered a myocardial infarction will not be considered for flying till 12 months after the episode of infarction.

b) **Coronary Artery Bypass Surgery (CABGS)** : Aircrew who have undergone CABGS procedure may be considered for certification provided they meet the following criteria:

- i) Minimum period of twelve (12) months should have elapsed since CABGS. He should have maintained functional class I (NYHA) for at least 6 months and had been on no cardioactive drugs except dispirin or persantin.
- ii) There should be no associated disease like Hypertension, Diabetes mellitus, Peripheral vascular disease or metabolic disorder. All modifiable risk factors should have been corrected.
- iii) There should have been no significant left main stem stenosis (50% or above).
- iv) The subject should be able to complete a symptom limited exercise ECG satisfactorily (usually Bruce stage 3 or more). It should not reveal reversible myocardial ischemia, left ventricular dysfunction, significant arrhythmias or fresh conduction defect.
- v) Radionuclide ventriculography should demonstrate an ejection fraction of equal or more than 50%.
- vi) A Thallium Scan should show no perfusion defect or LV dysfunction.
- vii) Colour Doppler Echocardiographic evaluation should reveal no structural disease of the heart, left ventricular dysfunction or significant regional wall motion abnormality.
- viii) Holter Monitoring for 24 hours should not reveal any abnormality of rate/rhythm/silent ischaemic episodes.

- ix) Repeat Coronary Arteriography with left ventriculography should objectively document, all grafts patent, no significant proximal disease and no lesion of more than 50% in the remaining ungrafted native circulation. Left ventriculography must demonstrate normal LV size, shape, contractibility and functions. There should be no significant mitral regurgitation.
8. Cases considered fit based on the above criteria will be certified fit for P1 status to fly with a qualified P2 only (with any other restriction). They will be reviewed at AFCME at least once in 12 months. Investigations including stress thallium and coronary angiography will be carried out as considered necessary by the Cardiologist of the Establishment.
9. Cases who have successfully undergone myocardial revascularisation procedures and have been returned to P1 status to fly along with a qualified P2 only, may after a three year period of follow up, be recommended for grant of P1 status, without restrictions on a case to case basis. If the recommendation is approved by DGMS (Air) such cases will continue to be followed up at AFCME only.
10. The disposal of cases who have undergone procedures like Rotablator, coronary atherectomy, stents, etc. will be the same as for PTCA. Similarly, the disposal after Minimally – Invasive Coronary artery Bypass Surgery/total arterial grafting etc. will be the same as for CABGS.

Appeal Procedure

11. Aircrew declared unfit for flying due to Ischaemic Heart Disease will have to apply to DGCA for reconsideration, after the specified period of observation as laid down in this circular. All such appeals shall be supported by the original or certified true copies of the complete medical record since the event (e.g. onset of angina or other symptoms, detection of IHD during any routine or special investigations and any operative procedure such as angioplasty/CABGS etc.)
12. The appeal, with the supporting documents, shall be considered by DGMS (Air) and only on acceptance of appeal by DGMS (Air) it will be communicated in writing to DGCA. The previous medical record shall be forwarded to AFCME/IAM for review. No direct review at any boarding centre is permitted in such cases.
13. Original records or authenticated video recordings of angiography, ultrasonography, Doppler study etc. will have to be produced at the time of review at AFCME/IAM.

(S.P. Verma)
Air Marshal
DGMS (Air)

