Original Article

Silent tuberculosis: An unexpected post mortem finding

Sqn Ldr K Kartik* Flt Lt (Mrs) K Kamakshi [$]
Flt Lt PR Ravi[@] Wg Cdr KV Ramakrishnan[+]

Flt Lt "X", pilot of a T-77 ac was killed on 21 Jun 97, following a mid air collision. During post mortem, Lt sided Pleuro Pulmonary TB was found. The officer was asymptomatic and in medical Cat A1G1. This unexpected post mortem finding is being presented as a case of Silent Tuberculosis. The aetiopathogenesis, presentation and clinicoradiological findings of Tuberculosis are discussed, in view of the marked resurgence in Tuberculosis, particularly Silent Tuberculosis. The present medical examination system is discussed and reviewed with a view of improving preventive health care.

Keywords: Silent-TD, aircrew, medical examination.

Flt Lt "X" was killed in a mid air collision with another T-77 a/c, piloted by a U/T ops Pilot Officer, who also died in the collision. The collision occurred as a result of the U/T ops, who was the No. 4 of the fmn in circuit, cutting his base leg short, following a hydraulic failure, and turning finals early. Flt Lt "X", the No. 3 was on finals at that time. Both pilots did not see each other and inspite of the ATC calling out to go round, the two ac collided about 1.5 km short of the runway at an altitude of 500 m. Both pilots were killed in the crash. The cause of the accident was HE (A).

Post mortem

The routine autospy conducted revealed a disquieting fact. Flt Lt "X" was found to have Lt sided Pleuro pulmonary TB. The sailent findings of the autospy are given below:

(a) Weight: (i) Right: 270 gm (Normal)
(ii) Left: 250 gm (Normal)

(b) Left Lung: It was adherent to the pleura. Lower lobe was removed in pieces. No evidence of cavitation was found. Enlarged lymph nodes were found along main branches of Lt bronchus and carnia. The cut surfaces showed caseous spots.

(c) Left Pleural Cavity: This was obliterated due to adhesions. The Parietal pleura was leathery with multiple yellow white nodules all over, predominantly in the lower lobe.

(d) Histology: Multiple fibrocaseous lesions in all stages of development were observed in left upper lobe, lower lobe and pleura.

(e) Acid Fast Bacilli (AFB) Staining: This was negative.

* *Cl Spl (Av Med), 52 Sqn, AF*
[$] *MD (Path), MO, 14 Wing, AF*
[@] *MO, 14 Wing, AF*
[+] *SMO, 14 Wing, AF*

These findings indicate a left sided pleuro pulmonary tuberculosis of some standing of the post primary/secondary tuberculosis type.

Investigation

These findings were totally unexpected. These findings led to an investigation being conducted, encompassing interviews, visits to local hospitals and check of all his activities during the period of his posting to his Squadron (26 Jan 96-21 Jun 97). The results are detailed below.

Interviews

The interviews included the CO's of his previous (17 Sqn) and present (20 Sqn) Squadrons, Squadron mates, pupils, neighbours, families and friends. All of them unanimously and unambiguously stated that they had never seen him look ill, let alone have a cough. His previous CO, who had just been posted in as COO, went to the extent of remarking that late Fit Lt "X", had put on weight and was looking healthy and fit. Apart from a general assessment of bodily health, specific questions e.g. cough, breathlessness, tiredness in the evenings, fatiguability, irritability, tendency to shirk work/secondary duties; all produced an answer in the negative. The general consensus was that he was one of the most active in the squadron, ever willing to take on more at all times. A look at his flying history further corroborates this point.

Flying History

Since his posting to the squadron in Jan 96, he has been on active flying status. The breaks from the squadron were when he went on leave (29 Dec 96 to 19 Jan 97) and when he was at TACDE for the PAI course (31 May 96 to 18 Aug 96). He has flown about 250 sorties of all types during the period Apr 96 to Jun 97. In the period Apr-Jun 97 he had flown 83 sorties. This flying effort compares favourably with any staff pilot who flies on an average about 25 sorties/month. Additionally in the two weeks prior to the ill fated sortie he had flown 4 sorties/day on no less than six occasions. In spite of flying so much, he did not complain of or show any signs of fatigue.

Physical fitness

As per the records he was declared fit in all quarters of the PFR. The last such test was held on Mar 97. More importantly, as an active sportsman he was part of the squadron basketball, hockey and volleyball teams. In fact as late as in May 97 he was playing basketball on a regular basis.

An additional pointer to his physical fitness and lack of symptoms was an incident which occurred two weeks prior to his ill fated sortie. Following an engine fire on take off, he landed, switched off, jumped out of the ac and ran 300 m on the runway shoulders in full flying clothing. The author was witness to the incident and when he was picked up a few minutes later there was no sign of undue breathlessness or cough.

Preflight medical and crew interaction

Preflight medical are carried out in the spirit of IAP 4307/4303. Most morning briefings are attended by the author. Crew interactions at the squadron is at least three times a week. During these times and during various social interactions, neither the author nor any other MO at the Station noted anything abnormal. At this juncture it is emphasized that the aircrew/medical report is excellent and no aircrew has any hesitation in reporting sick.

Visit to local hospitals

Self medication is always a doubt in such cases. Three km from the Wing is a 200 bedded multi speciality hospital (Tata Tea Referral Hospital). 25 m away is the Assam Medical College Hospital at Dibrugarh. There are no other private practitioners in a five km radius. Discussions with the specialists at these hospitals did not produce any evidence of visits by the officer.

Annual medical examination

This was conducted on 07 Mar 97 and no abnormality was found. In fact the officer was advised to reduce weight as he was on the upper limit of his weight range.

All these factors lead us to the inescapable conclusion that we are dealing with a largely silent disease process, about which probably the individual himself was unaware of.

Physiological considerations

Correlating with the autopsy findings, we are dealing with a case in which we can expect a reduced compliance, lung volume, V/Q abnormalities and reduction in SaO_2.

a) Compliance: A decreasing compliance causes an increase of work of breathing, both at rest and during exertion. Normally 2-3% of the total energy expenditure is on work of breathing. An increase above 5% manifests as exertional dysponea. With these findings, even though work of breathing would have increased, it would not have been sufficient to cause dysponea. What little dyspnoea that appeared on exertion would have been attributed to the weight gain/lack of peak physical fitness.

b) SaO_2: We would also expect an alteration in V/Q ratio, and this compounded with a thickening of the alveolar capillary membranes would lead to a decrease in SaO_2. However, for a person to be symptomatic, the SaO_2 has to fall below 90%. In the lung, physiological shunting of perfusion takes place to the less affected parts of the lung takes place, thus maintaining SaO_2. It is only when massive lung damage occurs that SaO_2 decreases.

Pathological considerations

The autopsy findings indicates that we are dealing with a secondary/post primary tuberculosis of some duration. The lessions were found predominantly over the left pleura and left lower lobe. They were basically fibrocasseous tubercles in various stages. The exact duration of such an infection cannot be pinpointed. However, no AFB have been demonstrated in the lesions. To quote "These caseating granulomas are the histologic hallmark of tuberculosis, but because similar lesions can have other infections and non infectious causes, tubercle bacilli should always be demonstrated to confirm a histologic diagnosis of tuberculosis. No culture was done in this case as there was no history and further it would have delayed the autopsy report. There is thus a reasonable doubt as to the diagnosis. However, given the extent of lesions and our setting, it would be reasonable to prompt a diagnosis of tuberculosis.

Another important factor in the spread of the disease is the immune status. It is well documented that the spread and destruction are much more rapid in an immune compromised individual than in a normal individual [4].Here we were hampered by the fact that no HIV testing was done. Fibrotic healing of the pleural cavity would take about 6-8 weeks following an insult. Thus it could be possible that a tubercle had caseated into the pleural cavity in the 12 weeks prior to the accident and set up all the changes described above. Thus in such a case the

medical exam would have drawn a blank in March. It is also documented that in early HIV disease there is lower lobe infiltration and rapid bronchogenic spread [5].

Clinical considerations

The symptomatology of TB is as varied as its presentation. In todays world, there are a growing number of cases with a typical presentation wherein there are few to none of the classical symptoms of TB [3, 4, 6, 7]. Classical tuberculosis presents with either symptoms due to systemic effects (fever, weight loss, evening rise of fever, fatiguability etc) or local effects (cough, sputum, haemoptysis). In this case none of these symptoms were present.

The signs of TB depend on the organ system involved. The autospy findings indicate a left pleural involvement leading to adhesions and obliteration of pleural cavity. The parenchymal lesions were predominantly seen only on histology. In such setting the sings expected to be found would be a decreased expansion of the left lower hemithorax, an impaired percussion note, increase in vocal resonance and a decrease in breath sounds. No adventitious sounds would have been expected. For these signs to be picked up, a careful step by step examination of the respiratory system would have been required. During Annual Medical Examination (AME), the prevalent practice is for the MOs to only auscultate the chest, at times with the overalls on. A detailed examination is done only when there is something to suggest a respiratory pathology. Furthermore, the examination of the respiratory system is studded with pitfalls and is notorious for its paucity of signs even in advanced disease conditions. The Chest Roentgenogram has been suggested as a more reliable and accurate means of picking up chest lesions than a clinical examination[8]Thus keeping all these facts in mind such cases would be missed and continue to be missed during Annual Medical Examination.

Medical Examinations

In this wing as in the rest of the Air Force, medical examinations are done in March and September. Coincidentally it is also the time when there is an increase in disease incidence (Onset of summer and withdrawal of monsoon). The workload in the SSQ thus shows an increase during the period. Also, invariably this SSQ has only two MOs at a given time catering to a client population of about 6800. The SMO, or the senior of the two is away attending to conferences, sanitary rounds and other station duties. Thus a large amount of the workload falls on the single remaining MO. In addition there are two Squadrons based at this wing, tasked with the MOFT (Mig Operational Flying Training) syllabus. There are about 15 U/T Ops Pilot Officers in each squadron learning to fly a fighter a/c. Each squadron flies about 300-330 sorties/month or about 15-20/day. The number of staff pilots range from 8-10, as against a TBM of 13. Hence there is an enormous pressure for an early return of the pilots to the squadron. All this adds to the pressure on the MOs and it is not possible to do a detailed check on each one of the aircrew or other reporting for medicals. This sort of problem would also be faced by other stations in varying degrees.

Therefore it suggested that in the best interests of preventive health care a biennial system of medical examination be adopted. The broad modalities of such a system would be as follows:

a) Medical exam would be conducted on the month in which the birthday falls due. This would ensure a more even year around spread.

b) Ever even year a long medical is conducted. This would entail ECG, Biochemical examination, Pulmonary Function Testing, Radiological Exam of chest and spine (cervical), HIV testing in addition to a thorough clinical exam. This medical would also give an opportunity for some sort of counselling and interaction between the MO and the aircrew. Counselling

would/could include topics like exercise, smoking, alcohol, drugs and martial problems etc.

c) Ever odd year a short medical on the lines of the AFMSF 3 could be carried out.

Conclusion

In conclusion a case of Silent TB has been discussed. The need for an awareness of such cases has been emphasized due to the evergrowing number of a typical cases. The authors have also attempted a method of modifying the present medical exam system with a view to improve preventive aircrew care.

References

1. Guyton Arthur C. "Respiration" in, A textbook of Medical Physiology, 7th edition, p 462-469, Pub: WJ Saunders & Co
2. Guyton Arthur C. "Respiration" in, A textbook of Medical Physiology, 7th edition, p 520-521, Pub: WJ Saunders & Co.
3. Lichtenberg Franz Von MD. Infectious Diseases, p 374-375 in Robbins Pathological Basis of Diseases 4th edition, Editors: Cortran, Kumar, Robbins, Pub: WJ Saunders & Co.
4. Corbett EL, KM De Cock. Tuberculosis in the HIV Positive Patient. *Journal of Applied Medicine*, 1997; 23(8): 583.
5. Rottenberg GT, P Shaw. Radiology of Pulmonary Tuberculosis. *Journal of Applied Medicine*, 1997; 23(7): 497.
6. Crompton GK, GJR McHardy. Diseases of the Respiratory System. p. 364-371 in Davidson's principles and practice of medicine 16th edition; Ed: CRW Edwards, IAD Boucher; Pub: ELBS.
7. TM Daniel Tuberculosis, p-710, in Harrison's principles of Internal Medicine 13th edition. Ed: KJ Isselbcher, Braunwald, JD Wilson, JD Martin, AS Fauci, DL Kaspar, Pb. McGraw Hill, New York.
8. Eugene Braunwald. Approach to the patient with diseases of the respiratory system, p-1145 in Harrison's principles of internal medicine 13th edition Ed: KJ isselbacher, Braunwald, JD Wilson, JD Martin, AS Fauci, DL Kaspar. Pub: McGraw Hill New York.