GURKHA BRONCHITIS

A Report on an Investigation of Acute Bronchitis Amongst Gurkha Troops from The British Military Hospital, Kluang

BY

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The large number of young adult males who frequent the sick parade with a cough makes an immediate impression on the Medical Officer fresh to the East.

These attacks of bronchitis do not necessarily clear up quickly and it was decided to discover whether they fell into one particular syndrome. An investigation was carried out over a period of six months at the Military Hospital, Kluang. This is a small hospital inland in south Malaya. It draws on two Gurkha training wings for most of its patients. There is very little change in the climate; neither the rainfall nor the daily range of temperature vary consistently with the time of year.

There was a big increase in cases during the period January to March; this was probably due to the arrival of a large batch of young Gurkha recruits fresh from Nepal.

A similar condition has been described by Shone and Passmore (1943). They were particularly interested in the discovery of high cold agglutinins. Unfortunately that account was not available when the present series were seen. Cold agglutination certainly occurred and was seen when blood slides were taken. It is possible that the high sedimentation rate was due to cold agglutination occurring in the Westergren tubes.

The frequency of bronchitis was estimated for the eighteen months prior to the present investigation. Fortunately the records for the four races that used the hospital were kept separate. A diagnosis of bronchopneumonia was
included with that of bronchitis, a study of the case records will show that these two are frequently stages in the condition.

<table>
<thead>
<tr>
<th>Race</th>
<th>Total admissions</th>
<th>Total chest conditions</th>
<th>Bronchitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europeans</td>
<td>812</td>
<td>40 (4·9 per cent)</td>
<td>30 (3·7 per cent)</td>
</tr>
<tr>
<td>Gurkhas</td>
<td>431</td>
<td>140 (32·3 per cent)</td>
<td>102 (23·3 per cent)</td>
</tr>
<tr>
<td>Malays</td>
<td>186</td>
<td>32 (17·2 per cent)</td>
<td>25 (13·4 per cent)</td>
</tr>
<tr>
<td>Sinhalese</td>
<td>475</td>
<td>92 (19·4 per cent)</td>
<td>64 (13·5 per cent)</td>
</tr>
</tbody>
</table>

(Percentages are for the total of each race admitted.)

**Method of Investigation**

Definite criteria were laid down to decide what patients should be included in the series. Patients who showed any three of the following features were admitted into hospital, for investigation.

1. Pain in the chest as a symptom.
2. Presence of a cough.
3. Temperature over 99°.
4. Abnormal added sounds on auscultation of the chest.

One case of proved malaria, and one case of tuberculosis were excluded, although they showed three of the above features. Patients were examined clinically, particular care was taken in examination of the skin and mucous membranes for any evidence of malnutrition. A history of past coughs and any chest trouble was taken, all patients were asked concerning any haemoptysis, and the amount of tobacco smoked was recorded.

**Laboratory Investigations**

Routine examinations on admission included a white cell count and differential; in the majority of cases 500 cells were counted in the differential. An estimation of the blood sedimentation rate was made, using the Westergren technique. The stool was examined microscopically for ova. The sputum was examined for acid-fast bacilli; in most cases only one specimen was examined unless there was any suspicion that the case was tuberculous, when six or more specimens were examined microscopically, and also cultured.

An X-ray examination of the chest was made on all cases; it was unfortunate that it was not feasible to carry out more bronchograms.

**Results**

Forty-two patients were fully investigated. They fall into two groups: there were 26 severe cases, and 16 mild cases.

The 26 severe cases will be discussed as they show considerable similarity. They are selected out of the total 42 cases as they all showed an X-ray change.

The name "bronchitis" may cause surprise when in fact the majority of cases develop a secondary bronchopneumonia. However, the first, and, as far
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as the patient is concerned, the worst symptoms are of a tracheo-bronchitis; it is therefore felt that "bronchitis" is a more useful name for the condition.

**The Main Features of the More Severe Cases of Gurkha Bronchitis**

<table>
<thead>
<tr>
<th>Symptom/Sign</th>
<th>Number of cases and percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain felt over the front of the chest</td>
<td>19 (73 per cent)</td>
</tr>
<tr>
<td>No pyrexia after the day of admission</td>
<td>15 (58 per cent)</td>
</tr>
<tr>
<td>A higher pyrexia in the morning than evening on three successive days</td>
<td>6 (Out of 11 with pyrexia)</td>
</tr>
<tr>
<td>A B.S.R. over 80 mm./hr.</td>
<td>6 (23 per cent)</td>
</tr>
<tr>
<td>A B.S.R. over 40 mm./hr.</td>
<td>22 (85 per cent)</td>
</tr>
<tr>
<td>A B.S.R. over 40 mm./hr. and yet no pyrexia</td>
<td>10 (38 per cent)</td>
</tr>
<tr>
<td>An absolute eosinophilia greater than 1,000 cells/c.mm.</td>
<td>No cases</td>
</tr>
<tr>
<td>Total severe cases, all with X-ray changes at the lung bases</td>
<td>26 (100 per cent)</td>
</tr>
</tbody>
</table>

**Symptoms and Signs**

The most common presenting symptom was pain in the chest; occasionally it was felt over the trachea, in the neck. The pain was central or to one side of the sternum; if to one side of the sternum it was usually found that the lung base most affected, clinically and on X-ray, was on the same side. Headache was an almost universal symptom. It might be severe although there was no pyrexia. The cough was a dry hacking cough; it was usually worst in the morning. In a certain number of cases there was a secondary infection, and in these cases a quantity of purulent sputum was produced. A mild earache with a relative deafness was a not uncommon finding. The drum appeared to be opalescent with mild injection. It was presumed that there may have been a catarrhal spread up the Eustachian tube.

Only in seven cases was there any history of a previous cough before the man's arrival in Malaya. In the majority of these attacks the cause of the cough seemed to be different from the present condition.

Three cases gave a history of a recent haemoptysis. The tobacco habits of all these men were very moderate, the majority smoked less than ten cigarettes a day.

Many of these men were miserable on admission. This was in part due to their troublesome cough, but also due to their headache and pain in the chest; the latter was present all the time and only aggravated by the cough.

The temperature and pulse were raised on admission, but frequently settled during the first day in bed. An unusual finding was made in 6 of the 11 that showed a raised temperature. In these 6 the temperature was higher in the morning between six and ten o'clock, than in the evening; this was only considered significant if it occurred on three successive mornings. In some cases it was well marked (see copy of chart in Case 29).

At the start of the investigation it was considered that a deficient diet might be a precipitating factor. Investigation of the skin and mucous membranes did not yield any evidence to support this. Also it was fairly definite that no
deficiency could have occurred on the Army diet as long as the man did not leave part of his food for religious, or other reasons.

The nose and throat were normal in the majority of cases. The chest showed clinical changes in all cases. Any change in the note on percussion or in degree of movement was too slight to be significant. On auscultation, moderate-to-coarse crepitations were heard at one or other lung base in every case. At an early stage rhonchi were frequently present; in a few cases the crepitations could be heard over all areas of the chest. The changes in the lungs persisted almost as long as the raised B.S.R.; a spread to the opposite lung in Cases 25 and 29 (shown by clinical and X-ray examination) was associated with a further rise in the B.S.R. The length of time before the signs in the chest cleared up varied considerably, and it was not usually less than two weeks.

**Laboratory Findings**

These were limited to the simpler techniques. The white cell count was usually within normal limits; it was raised as would be expected in those producing a purulent sputum. It was raised quite inexplicably in Case 33. The mean white blood count for the series was 8,500 cells/c.mm. One of the most surprising findings was a complete absence of any eosinophilia. Not a single one of the 26 cases classified as severe (on account of X-ray changes) showed an absolute eosinophilia of more than 1,000 cells/c.mm. A type of lung condition associated with an eosinophilia is occasionally seen in a Gurkha, it is essentially different, in particular because it does not start as bronchitis. This eosinophilic lung condition is similar to that described by Weigarten (1943).

The haemoglobin was found to be within the normal limits for young Gurkhas.

The B.S.R. was most strikingly raised. In almost a quarter of these cases it was over 80, a figure out of all proportion to the apparent severity of the condition. A reading of 60 was sometimes found in a patient who had had no pyrexia during his whole stay in hospital. The B.S.R. was used as an indication of recovery and a fall below 30 mm./hr. was required before discharge.

Routine stool examinations were carried out. A third of the patients showed infestation with *Ascaris lumbricoides*. The significance of this was extremely doubtful as there is a very high rate in the local Malayan population.

Sputum was examined in all cases for acid-fast bacilli. Direct smears and culture were carried out in a few cases only. In those patients who did not show a secondary infection, the sputum was very scanty.

**X-ray Findings**

The changes on X-ray were almost confined to the lung bases. The typical finding was a mottled appearance at one or both bases and this was well shown in the photograph of the X-ray of Case 13. Attempts to demonstrate a limitation to one or more basal segments by lateral views were unsuccessful. The appearance was most probably due to small areas of collapse.
A bronchogram on one of the severe cases (29) showed a very mild bronchiectasis. This was taken at the end of the acute attack and there was no reason to suppose that it was more than a temporary change.

TREATMENT

A routine Army expectorant mixture was used as a placebo. When the cough was particularly troublesome a codein or heroin linctus was used at night. No specific treatment was given a proper trial. Except where there was a secondary infection, penicillin and the sulphonamides appeared to have no effect.

COMMENTARY

The high incidence of bronchitis in Asian as opposed to European troops in Malaya is surprising. The particular frequency amongst Gurkhas led to the present investigation. This high incidence in Gurkhas seems to be due to a definite syndrome and an attempt has been made to describe this syndrome. The attack starts as a tracheitis and bronchitis. Clinically and radiologically there is then a spread to the bases of the lungs. The headache and high sedimentation rate are suggestive of a widespread disturbance. The other particular feature is the frequent absence of pyrexia; and in those in which a temperature occurs, after the day of admission the fever tends to be higher in the morning than evening.

The aetiology of this condition is unknown, it is likely that it is infective, but there was no opportunity to attempt to work out an epidemiology. The majority of cases occurred in recruits who had only recently arrived from Nepal. It was most unlikely that this was a primary tuberculous infection and a case seen after the end of this investigation had a well-marked calcified Ghon focus; also it would be surprising if every case cleared up as these were found to do. It was most unlikely that this was due to the migration of helminth larvae since the presence or absence of ova in the stool bears no relation to the presence of the larvae in the lungs.

This condition produces a serious loss of time to the recruits during their training. From the medical officer's point of view it is also important as a condition from which to differentiate the all too common tuberculosis. There is also a possibility that it is a precursor of bronchiectasis.

SUMMARY

1) Bronchitis was found to be very common amongst Asiatic troops particularly Gurkhas.

2) The findings in 26 of the more severe cases are described; the main features of these cases were:

(a) They started as a bronchitis.

(b) The frequent absence of temperature after the first day. When a temperature did occur it was common for it to be higher in the morning than the evening.
(c) A typical change at the bases of the lungs both clinically, and on X-ray.
(d) A high B.S.R., but no eosinophilia.
(3) The aetiology of the condition is unknown.

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The case sheets on these patients have been divided into two groups.1
(1) 26 severe cases with X-ray changes. Nos. 1, 4, 6, 10, 13, 14, 15, 18, 22, 23, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34, 37, 38, 39, 40, 41, 42.
(2) 16 cases which were milder and showed no change on X-ray. Nos. 2, 3, 5, 7, 8, 9, 11, 12, 16, 17, 19, 20, 21, 30, 35, 36.

and also brief notes, and a photograph of an X-ray, from a similar condition in a Malay soldier.

Case 1.—N——, aged 17. One month's service in Malaya.
History.—He had a cough at the depot before leaving India.
Symptoms.—One week's cough. No pain in the chest.
Clinical Findings.—Moist crepitations were to be heard in all areas, but were most marked and most persistent in the left base. For the first two weeks the temperature was intermittently raised. On several occasions it was higher in the morning than in the evening by as much as two degrees Fahrenheit.
Investigations.—W.B.C. 12,200/c.mm. Hb. 100 per cent. Polys. 76 per cent, lymphos. 18 per cent, monos. 2 per cent, eosinos. 3 per cent, basos. 1 per cent. B.S.R. (8) 95 mm./hr. (13) 97 mm./hr. (29) 55 mm./hr. (40) 22 mm./hr. Sputum: No A.F.B. Stool: Trichuris trichiura ova present.

X-ray: (13) Appearance at left base suggests bronchopneumonia. (26) Still shows some residual opacity.

Case 4.—H——, L——, aged 20. Nine months' service in Malaya.
History.—No previous illness.
Symptoms.—Pain over the sternum and trachea for four days, cough for fifteen days.
Clinical Findings.—Scattered crepitations and expiratory rhonchi at both bases. Crepitations persisted for one month. Temperature occasionally raised to 99° F. only.
Investigations.—W.B.C. 10,600/c.mm. Hb. 97 per cent. Polys. 75 per cent, lymphos. 20 per cent, eosinos. 1 per cent, monos. 4 per cent, basos. nil. B.S.R. (2) 40 mm./hr. (26) 18 mm./hr. (35) 16 mm./hr. Sputum: No A.F.B.


Comment.—A case showing considerable change in the X-ray appearance of the lungs, with no change in the temperature chart.

Case 10.—S——, aged 20. Ten months' service in Malaya.
History.—No past history of chest trouble.
Symptoms.—Three days' cough and fever, no pain in the chest.
Clinical Findings.—Marked moist crepitations, with slight consolidation at right base.
Pyrexia for six evenings up to 102° F.

1At the Author's suggestion, in order to reduce the space and costs required for publication and illustration, many of the case reports have been omitted and only a few illustrations used. In the original paper the cases and X-ray photographs are very interesting.
—Ed.

2N.B. Figures in brackets e.g. (11) denote the number of days after admission that the test was performed.
Investigations.—W.B.C. 8,900. Hb. 92 per cent. Polys. 63 per cent, lymphos. 27 per cent, monos. 6 per cent, eosinos. 4 per cent, basos. nil. B.S.R. (11) 58 mm./hr. (16) 60 mm./hr. (32) 42 mm./hr. (44) 27 mm./hr. (55) 20 mm./hr. Stool: Ova of Ascaris. Sputum: No A.F.B.

X-ray: (6) Considerable mottling both bases. Right more than left. Radiologically it appears to be a bronchopneumonia. (37) Both lung fields now clear.

Comment.—This appears to be a case of bronchopneumonia; efforts to cultivate an organism were unsuccessful also the low white count is against a bacterial origin.

Case 13.—B——, aged 19. Two years’ service in Malaya.

History.—Only mild coughs previously.

Symptoms.—Slight haemoptysis on first day of cough. Two days’ cough and pain over the front and upper part of the chest.

Clinical Findings.—Numerous fine moist crepitations at right base. Temperature rose to 104°F. on the third night after admission and then fell to become afebrile on the sixth evening.

Investigations.—W.B.C. 6,400/c.mm. Hb. 90 per cent. Polys. 75 per cent, lymphos. 15 per cent, eosinos. 4 per cent, monos. 6 per cent, basos. nil. B.S.R. (1) 89 mm./hr. (3) 87 mm./hr. (13) 52 mm./hr. (20) 39 mm./hr. (32) 17 mm./hr. Stool: No ova. Sputum: No A.F.B. found.

X-ray: (7) Mottling at right base probably a bronchopneumonia. (28) Considerable resolution of mottling.

Comment.—A typical case.

This X-ray shows the very typical mottled appearance at the right base. The W.B.C. was 6,400 cells/c.mm. and the B.S.R. 89 mm./hr. at the time when this film was taken.

Case 22.—B——, aged 18. Three weeks’ service in Malaya.

History.—Occasionally he had had a cough with pain in the chest in the past in Nepal.
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Symptoms.—Cough had been present for three weeks, also for the last three weeks he had had pain over the trachea which was worse on coughing.

Clinical Findings.—Crepitations were heard at both lung bases; they cleared up in about a week on rest in bed. The temperature was raised for the first twelve days. There was a tendency for the temperature to be raised higher in the morning than in the evening.

Investigations.—W.B.C. 6,300 cells/c.mm. Hb. 97 per cent. Polys. 55 per cent, lymphos. 40 per cent, monos. 0·5 per cent, eosinos. 3·5 per cent. B.S.R. (1) 82 mm./hr. (20) 40 mm./hr. (34) 50 mm./hr. (43) 22 mm./hr. Sputum: No A.F.B. found. Stool: Ova of Trichuris, Ascaris and Ancylostoma duodenale.

X-ray: (1) Lung fields show slight increase in opacity at the left base. (7) Radiologically further spread. (26) Some clearing at left base.

Comment.—A fairly severe case as shown by the six weeks it took for the B.S.R. to settle.

Case 23.—S——, aged 17. One week’s service in Malaya.

History.—He had a previous attack of pain in the chest with fever in Nepal.

Symptoms.—Cough for two weeks, together with pain to either side of the sternum.

Clinical Findings.—Moist crepitations were heard at both bases for three weeks.

Pyrexial for two evenings only.

Investigations.—W.B.C. 7,800. Hb. 98 per cent. No differential count performed.

B.S.R. (2) 72 mm./hr. (16) 30 mm./hr. Stool: No ova seen. Sputum: No. A.F.B. seen.

X-ray: (2) Very slight mottling at left base. (22) Left base now clear.

Case 25.—T——, aged 17. One month’s service in Malaya.

History.—No previous chest trouble.

X-ray of Case 25.

This is the second X-ray of this patient. The opacity at the rt. base has decreased slightly, there is the beginning of the spread to the left base which was slower in final resolution. The W.B.C. was 7,700 cells/c.mm. and the B.S.R. 106 mm./hr. The patient had been apyrexial for one week.
Symptoms.—Cough for thirteen days. No pain in the chest.

Clinical Findings.—Moist crepitations were present for three weeks in the chest; at first these were to be heard all over but eventually disappeared except for the bases. Temperature was raised for five days only. There was a slight tendency for the temperature to be higher in the morning than at night.

Investigations.—W.B.C. 7,700/c.mm. Hb. 89 per cent. Polys. 75 per cent, lymphos. 22 per cent, monos. 2 per cent, eosinos. 1 per cent, basos. nil. B.S.R. (2) 88 mm/hr. (10) 106 mm/hr. (21) 50 mm/hr. (34) 48 mm/hr. (42) 20 mm/hr. Stool: No ova seen. Sputum: No A.F.B. seen.

X-ray: (2) Appearance of a bronchopneumonia at right base. (10) Considerable clearing at right base; there is now a similar opacity at left base. (20) Residual mottling, left base more than right.

Case 29.—R. One month’s service in Malaya.

History.—No chest trouble in the past.

Symptoms.—Cough for two days, with pain over the sternum.

Clinical Findings.—Signs at both bases, right more than left. There was a decrease in breath sounds with crepitations, these signs lasted for about three weeks. This patient showed the morning rise in temperature particularly well, with a fall to normal in the morning for a whole week; after this his temperature settled completely (see chart).

Investigations.—W.B.C. 9,100 cells/c.mm. Hb. 93 per cent. Polys. 68 per cent, lymphos. 20 per cent, eosinos. 4 per cent, basos. 2 per cent. B.S.R. (1) 84 mm/hr. (8) 112 mm/hr. (15) 102 mm/hr. (27) 85 mm/hr. (41) 18 mm/hr. Stool: Ova of Trichuris trichiura. Sputum: No A.F.B. seen.

X-ray: (1) Appearance of a left basal bronchopneumonia. (8) Spread to both bases. (17) Still considerable opacity left base, right base clearing. (35) Bronchogram: Very slight degree of cylindrical bronchiectasis on the left side affecting mainly the lower
branches of the left lingula, and also to a much less degree the basal bronchi of the left lower lobe.

*Gurkha Bronchitis*

This film was taken a week after admission. There is a spread to the right base. The patient had been running a morning temperature for a week. The patient was not very ill. His B.S.R. had now risen to 112 mm./hr.

**Case 29.**

*History.*—He had mild coughs in the past. He had one attack of fever with pain in the chest five months ago at the depot in India.

*Symptoms.*—A cough for seven days with pain over the lower sternum.

*Clinical Findings.*—This man looked miserable on admission with headache and pain in the chest. Loud moist crepitations persisted at both lung bases for two weeks. He ran no temperature for the whole period of three and a half weeks that he was in hospital.

*Investigations.*—W.B.C. (3) 22,000 cells/c.mm. (6) 12,800. (11) 4,900. Hb. 94 per cent. Polys. 83 per cent, lymphos. 10 per cent, eosinos. 5 per cent, monos. 2 per cent.

B.S.R. (1) 70 mm./hr. (11) 52 mm./hr. (22) 30 mm./hr. Stool: Ova of Ascaris and Trichuris. Sputum: No A.F.B. seen.

*Comment.*—Although he remained apyrexial this was a fairly severe case. It was the only case to show a raised W.B.C.

**Case 33.**—S——, aged 22. Three months' service in Malaya.

*History.*—He has had mild coughs in the past. He had one attack of fever with pain in the chest five months ago at the depot in India.

*Symptoms.*—A cough for seven days with pain over the lower sternum.

*Clinical Findings.*—This man looked miserable on admission with headache and pain in the chest. Loud moist crepitations persisted at both lung bases for two weeks. He ran no temperature for the whole period of three and a half weeks that he was in hospital.

Investigations.—W.B.C. (3) 22,000 cells/c.mm. (6) 12,800. (11) 4,900. Hb. 94 per cent. Polys. 83 per cent, lymphos. 10 per cent, eosinos. 5 per cent, monos. 2 per cent.

B.S.R. (1) 70 mm./hr. (11) 52 mm./hr. (22) 30 mm./hr. Stool: Ova of Ascaris and Trichuris. Sputum: No A.F.B. seen.

*Comment.*—Although he remained apyrexial this was a fairly severe case. It was the only case to show a raised W.B.C.

**Case 39.**—K—— B——, aged 18. Two months' service in Malaya.

*History.*—No pain or cough before.

*Symptoms.*—He had had a cough for nine days. He had not had any pain in the chest.

*Clinical Findings.*—At first there were very few signs in the chest, other than a reduction of breath sounds at both bases. After about five days loud crepitations were heard, these persisted for about two weeks. The temperature was not raised during the four weeks that this man was in hospital.
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Investigations.—W.B.C. 9,600 cells/c.mm. Hb. 102 per cent. Polys. 59 per cent, lymphos. 35 per cent, monos. 4 per cent, eosinos. 1 per cent, basos. 1 per cent. B.S.R. (2) 60 mm./hr. (11) 75 mm./hr. (22) 41 mm./hr. Stool: No ova or cysts found. Sputum: No A.F.B. found.

X-ray: (1) Mottling at both bases. (11) Lung fields now appear clear.

Comment.—Hospitalization did not prevent this patient becoming worse as judged by the signs in his chest and B.S.R.

A Similar Case in a Malay

Occasionally a similar condition appears in Malay troops. This man complained of pain over the sternum with headache and a cough. He had marked moist crepitations at the base of the left lung. His B.S.R. on admission was 75 mm./hr. His white count was within normal limits with no eosinophilia. The X-ray shows a mottling at the left lung base. This condition appears to run a shorter course in Malays.

This work was carried out while acting as a G.D.M.O. at the Military Hospital, Kluang. I wish to thank the O.C. Hospital and other members of the medical staff for their assistance, also the Consulting Physician for his encouragement. I am particularly indebted to Major Paul, the Command Radiologist, for his advice and permission to quote the reports on his X-rays; and acknowledge the permission of the Director-General, Army Medical Services, to publish this article.

Finally a word for the National Serviceman. He, unasked, finds himself working in ward or laboratory, but nevertheless he takes a keen interest, and is doing a fine job.

REFERENCES

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Weigarten (1943) Lancet, 1, 103.