

Intrathoracic foreign bodies

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Large series of patients with intrathoracic foreign bodies, especially those in the bronchi and oesophagus, have been documented (for example, the Jackson Clinic in Philadelphia has experience of well over 5,000 cases (Jackson and Jackson, 1959)) and the management of such foreign bodies in the hands of experts is standard and safe. Series such as this do not, however, indicate the incidence of foreign bodies in the thorax in a particular population since the cases treated in Philadelphia had been attracted from a wide area and the patients were often those in whom management of the foreign body had failed elsewhere. The results of treatment in the Jackson Clinic drew attention first to the frequency of disaster when intrathoracic foreign bodies were managed by the inexpert. It has been said that the justification for specialization is the opportunity that this gives to those 'with vision and skill to probe the frontiers of knowledge.'¹ But skill is directly related to practice and is always acquired, although perhaps more quickly and easily by some. Another important justification for specialization is that it offers the opportunity for practice without which surgery is dangerous; nowhere in surgery is there room for the occasional exponent.

The purpose of this paper is to review the experience of intrathoracic foreign bodies over a 10-year period, 1950-59, in the Regional Thoracic Unit in Edinburgh, which serves a relatively static population of one and a half million, and from this review to emphasize some aspects of, and pitfalls in, management. The cases treated are detailed in the Table. The number is relatively small, an average of five a year, and the results of management are reasonably good. One of 50 patients treated died; his death in 1950 was related to the erosive effect of prolonged retention of a coin in the oesophagus and failure at thoracotomy to anticipate the extent of this and to modify management accordingly.

INTRABRONCHIAL FOREIGN BODIES

Teeth were the commonest foreign body to lodge in the bronchi, and of the eight patients in whom

a tooth lay in a bronchus, five had recently undergone dental treatment. Of these five, only one was referred for a surgical opinion on the day of dental extraction; the other four had had respiratory symptoms for one to three weeks before chest radiography was undertaken. Six of the eight teeth were in the right stem bronchus (Fig. 1) and two in the left. Teeth, because of their shape, often do not completely obstruct a bronchus, and in only one of the eight patients with an intrabronchial tooth was there lobar shrinkage distal to the foreign body. In this patient (case 7) the tooth had been retained for 15 days and was made of radio-translucent plastic. The patient had been involved in a traffic accident and had extensive facial injuries. His dental plate had been fragmented and much of it lost. Recovery from injury was complicated by respiratory infection, and he was referred for therapeutic bronchoscopy because of persisting lobar collapse. A plastic tooth was removed at bronchoscopy from the right intermediate bronchus and thereafter recovery was uneventful. If the plastic tooth had been radio-opaque its removal is less likely to have been delayed. Six of the remaining seven intrabronchial teeth were removed at bronchoscopy; the seventh, in a child of 6, could not be disimpacted from the right main bronchus and was removed by bronchotomy at formal lateral thoracotomy. Recovery in all the patients was uneventful. In all in whom the tooth had been retained for longer than a week a bronchogram was made at a subsequent visit and none was abnormal.

It is common to be unable to deliver through the bronchoscope a tooth grasped in a forceps, because the greatest diameter of the distal end of the forceps with the foreign body in its grasp is greater than that of the distal end of the bronchoscope. In these circumstances the technique is to withdraw the forceps holding the tooth until these are wedged in the distal end of the bronchoscope and then to remove together endoscope, forceps, and foreign body from the trachea and, with particular care and gentleness, through the larynx.

A granite pebble (case 9) impacted in the right main bronchus was the only intrabronchial foreign

¹ Editorial, *J. roy Coll. Surg. Edinb.*, 1963, 8, 162.

TABLE

Case No.	Sex	Age	Foreign Body	Site	Period of Retention	How Removed	Subsequent Investigation
1	F	37	Tooth	L. main bronchus	10 days	Bronchoscopy	Bronchogram normal
2	F	6	Tooth	R. main bronchus	1 day	Bronchotomy	Bronchogram normal
3	F	25	Tooth	Intermediate bronchus	7 days	Bronchoscopy	Bronchogram normal
4	F	9	Tooth	Intermediate bronchus	15 days	Bronchoscopy	Bronchogram normal
5	M	25	Tooth	R. lower bronchus	1 day	Bronchoscopy	Bronchogram normal
6	F	18	Tooth	L. main bronchus	17 days	Bronchoscopy	Bronchogram normal
7	F	52	Plastic tooth	Intermediate bronchus	15 days	Bronchoscopy	Bronchogram normal
8	F	29	Tooth	Intermediate bronchus	20 days	Bronchoscopy	Bronchogram normal
9	M	15 mth	Pebble	R. main bronchus	5 days	Bronchoscopy	Bronchogram normal
10	M	10	Ball bearing	R. main bronchus	12 hours	Coughed up	Bronchogram normal
11	M	12	Plastic cap	R. lower bronchus	8 days	Bronchoscopy	Bronchogram normal
12	M	8	Plastic cap	L. lower bronchus	30 days	Bronchotomy	Bronchogram normal Bronchogram showed bronchiectasis
13	M	50	Bone	R. anterior basal	7 days	Bronchoscopy	Bronchogram normal
14	M	41	Bone	R. lower bronchus	3 days	Bronchoscopy	Bronchogram normal
15	M	54	Bone	L. main bronchus	Uncertain but more than a year	Bronchoscopy	Bronchogram showed bronchiectasis
16	F	52	Bone	Intermediate bronchus	5 years	Bronchoscopy	Bronchogram showed bronchiectasis; resected
17	M	60	Bone	L. lower bronchus	12 years	Bronchoscopy	Bronchogram showed bronchiectasis
18	M	56	Peanut	L. lower bronchus	12 hours	Bronchoscopy	Bronchogram normal
19	F	56	Peanut	Intermediate bronchus	7 days	Bronchoscopy	Bronchogram normal
20	F	5	Peanut	Intermediate bronchus	6 hours	Bronchoscopy	Bronchogram normal
21	M	12	Pea	Intermediate bronchus	1 day	Bronchoscopy	Bronchogram normal
22	F	20	Juniper twig	R. basal bronchus	3 months	Bronchoscopy	Bronchogram normal
23	F	12	Timothy grass	Intermediate bronchus	8 days	Bronchoscopy	Bronchogram showed bronchiectasis
24	M	45	Chewing gum	L. lower bronchus	1 day	Bronchoscopy	Bronchogram normal
25	F	15	Dental reamer	R. posterior basal	1 day	Bronchotomy	Bronchogram normal
26	M	29	Metallic fragment	R. posterior segment	10 years	Segmental resection	Bronchogram normal
27	M	34	Metallic fragment	R. posterior segment	12 years	Segmental resection	Bronchogram normal
28	M	42	Metallic fragment	R. apical lower segment	13 years	Segmental resection	Bronchogram normal
29	M	32	Metallic fragment	L. apical lower segment	15 years	Segmental resection	Bronchogram normal
30	M	22	Knife	R. upper lobe	3 hours	Withdrawn	Bronchogram normal
31	M	67	Surgical swab	R. pleura	1 hour	Thoracotomy	Bronchogram normal
32	M	62	Surgical swab	L. pleura	1 day	Thoracotomy	Bronchogram normal
33	M	54	Drainage tube	R. pleura	1 day	Thoracotomy	Bronchogram normal
34	F	72	Drainage tube	R. pleura	Years	Thoracotomy	Bronchogram normal
35	M	11	Shilling	Oesophagus, 17 cm.	1 day	Oesophagoscopy	Bronchogram normal
36	M	9	Penny	Oesophagus, 25 cm.	12 hours	Oesophagoscopy	Bronchogram normal
37	F	2 mth	Sixpence	Oesophagus, 12 cm.	3 hours	Oesophagoscopy	Bronchogram normal
38	F	3	Halfpenny	Oesophagus, 17 cm.	7 days	Oesophagoscopy	Bronchogram normal
39	M	15	Halfpenny	Oesophagus, 18 cm.	1 year	Thoracotomy	(Died 1st day from haemorrhage)
40	M	39	Meat	Oesophagus, 33 cm.	18 hours	Oesophagoscopy	Barium swallow and endo- scopies normal
41	M	22	Liver	Oesophagus, 18 cm.	7 days	Oesophagoscopy	Barium swallow and endo- scopies normal
42	M	42	Fish	Oesophagus, 34 cm.	2 days	Oesophagoscopy	Barium swallow and endo- scopies normal
43	F	74	Meat	Oesophagus, 33 cm.	4 days	Oesophagoscopy	Barium swallow and endo- scopies normal
44	F	18	Dental plate	Oesophagus, 33 cm.	1 day	Oesophagoscopy	Bronchogram normal
45	F	22	Dental plate	Oesophagus, 20 cm.	12 hours	Oesophagoscopy	Bronchogram normal
46	M	42	Bone	Oesophagus, 27 cm.	3 hours	Oesophagoscopy	Bronchogram normal
47	M	18	Bone	Oesophagus, 18 cm.	2 days	Oesophagoscopy	Bronchogram normal
48	F	42	End of cardiac catheter	R. atrium	7 days	Thoracotomy	Bronchogram normal
49	F	32	Sewing needle	L. ventricle	3 hours	Thoracotomy	Bronchogram normal
50	M	15	Bullet	L. ventricle	7 days	Not removed	Bronchogram normal

body in this series to be responsible for obstructive emphysema (Fig. 2). The diameter of a bronchus in inspiration is about one-third greater than in expiration. An irregular foreign body may be held in a proximal bronchus by projections from its surface and yet allow of the distal passage of air with inspiration. When the diameter of the bronchus is reduced in expiration egress of air may

be prevented and the lung distal to the obstruction becomes distended.

A steel ball-bearing in the right main bronchus (case 10) was the only intrabronchial foreign body in this series to respond to the time-honoured management of up-ending the patient and beating him on the back. This management was suggested to the child's mother by the radiographer, who

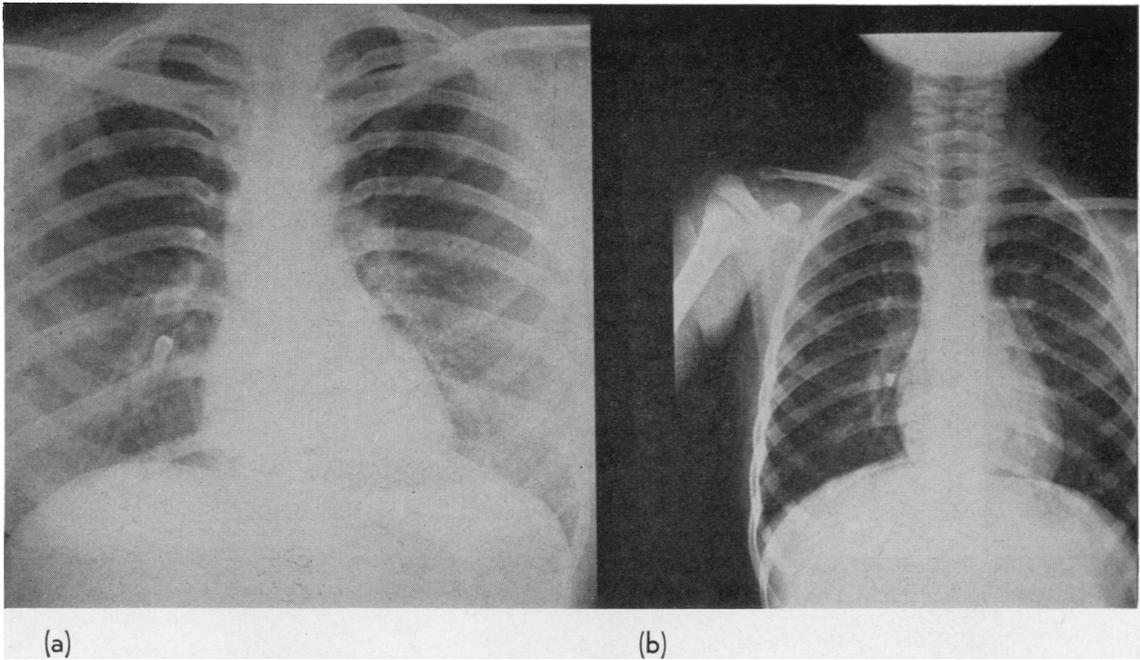


FIG. 1. *Two examples of teeth which have lodged at the level of the midale bronchus. This is a common site for the impaction of intrabronchial foreign bodies because at this level the stem bronchus narrows somewhat abruptly. The absence of subtended pulmonary shrinkage or distension is usual when teeth lodge in the bronchi for a relatively short space of time. In (a) the tooth had previously been filled, and in (b) the tooth is a milk tooth (cases 3 and 4).*

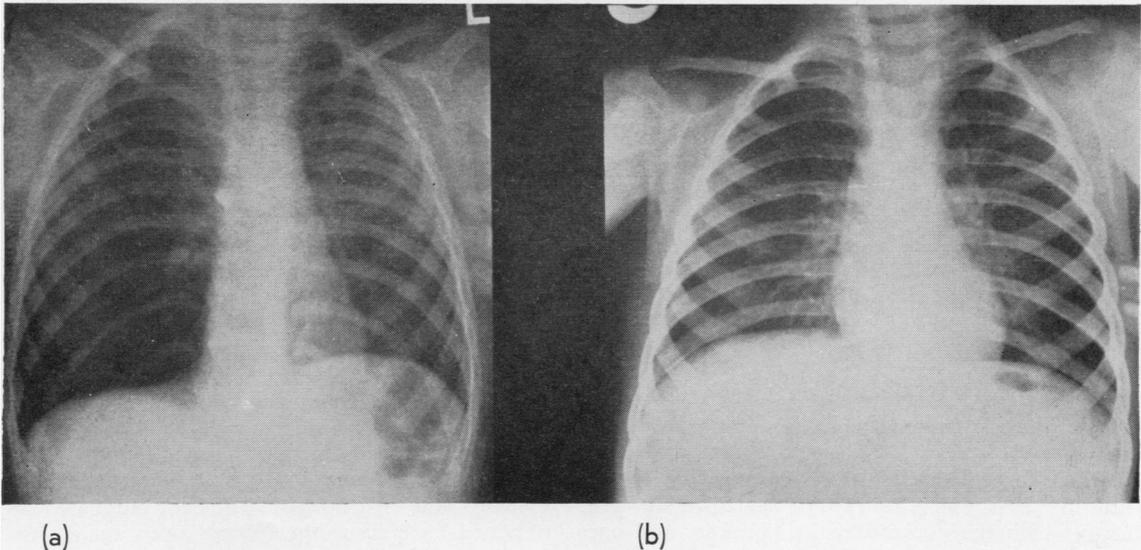


FIG. 2. *A granite pebble, lodged in the right main bronchus, has produced obstructive emphysema of the right lung (a); a radiograph made shortly after removal of the foreign body (b) shows that the distended lung has returned to normal (case 9).*

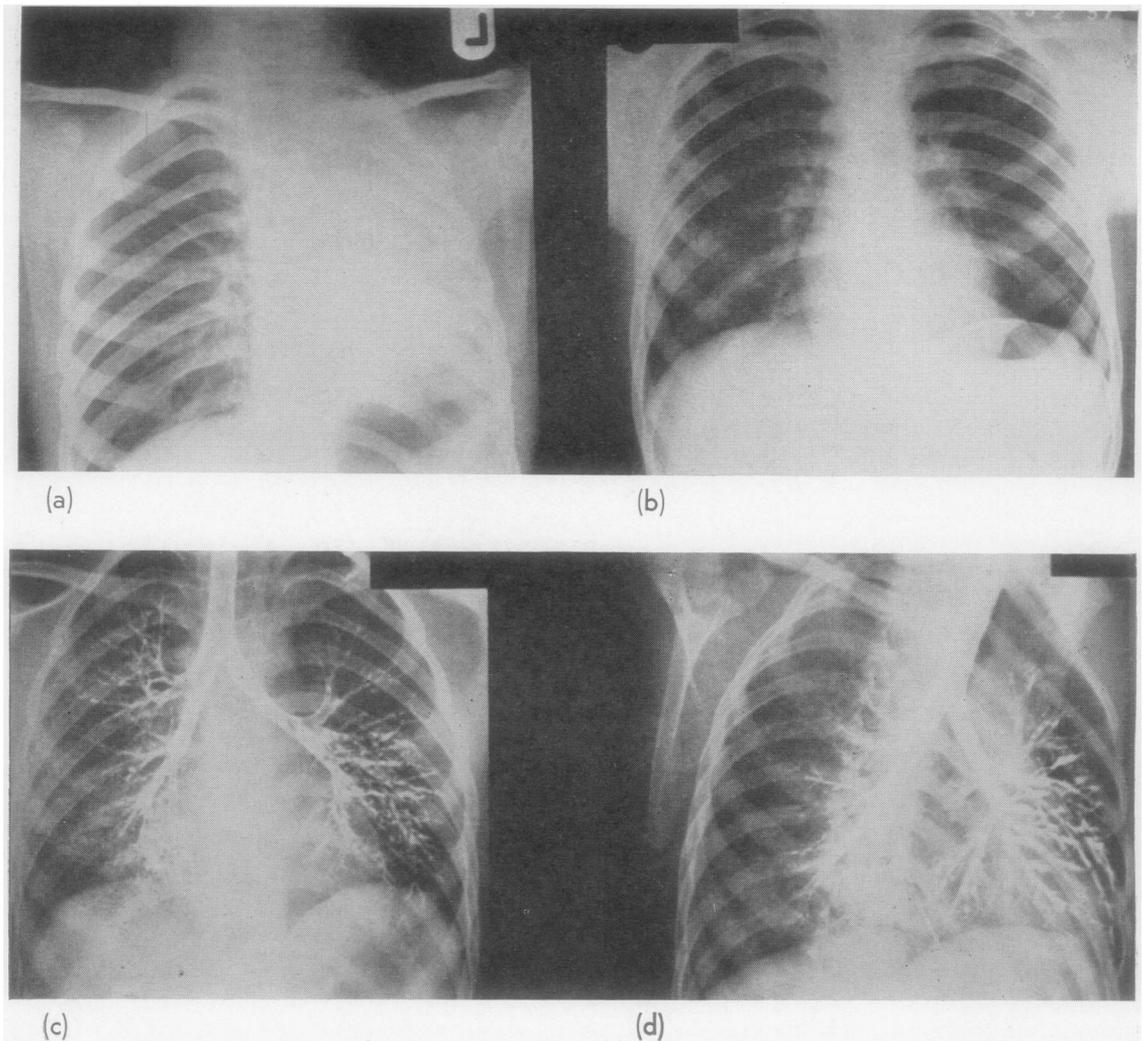


FIG. 3. The plastic cap from a ball-point pen had been aspirated one month before the postero-anterior chest radiograph (a) was made. The foreign body resisted attempts at removal at bronchoscopy and was removed by bronchotomy at formal left thoracotomy. A post-operative radiograph (b) is shown. A bronchogram made some weeks later (c and d) shows the left bronchi to be abnormal, but the child did not have respiratory symptoms and no further action was taken (case 12).

recognized the nature of the foreign body when she scrutinized the chest radiograph she had just made.

Radio-translucent plastic caps were twice removed; one was the cap of a ball-point pen from which the pocket clip had broken, and one was the cap from a toy lipstick container. These roughly cone-shaped foreign bodies had both entered the bronchi point first so that the cavity of the cap presented to the bronchoscopist. In

neither instance could the edge of the foreign body be grasped, so tightly was it wedged against the bronchial wall. A closed crocodile biopsy forceps was introduced into the cavity of each of the caps and then opened. Sufficient purchase was obtained by holding the forceps open against the interior wall of the cap to allow removal of one of them; in the other patient, removal was achieved at bronchotomy. This cap had been retained for a month, and a subsequent broncho-

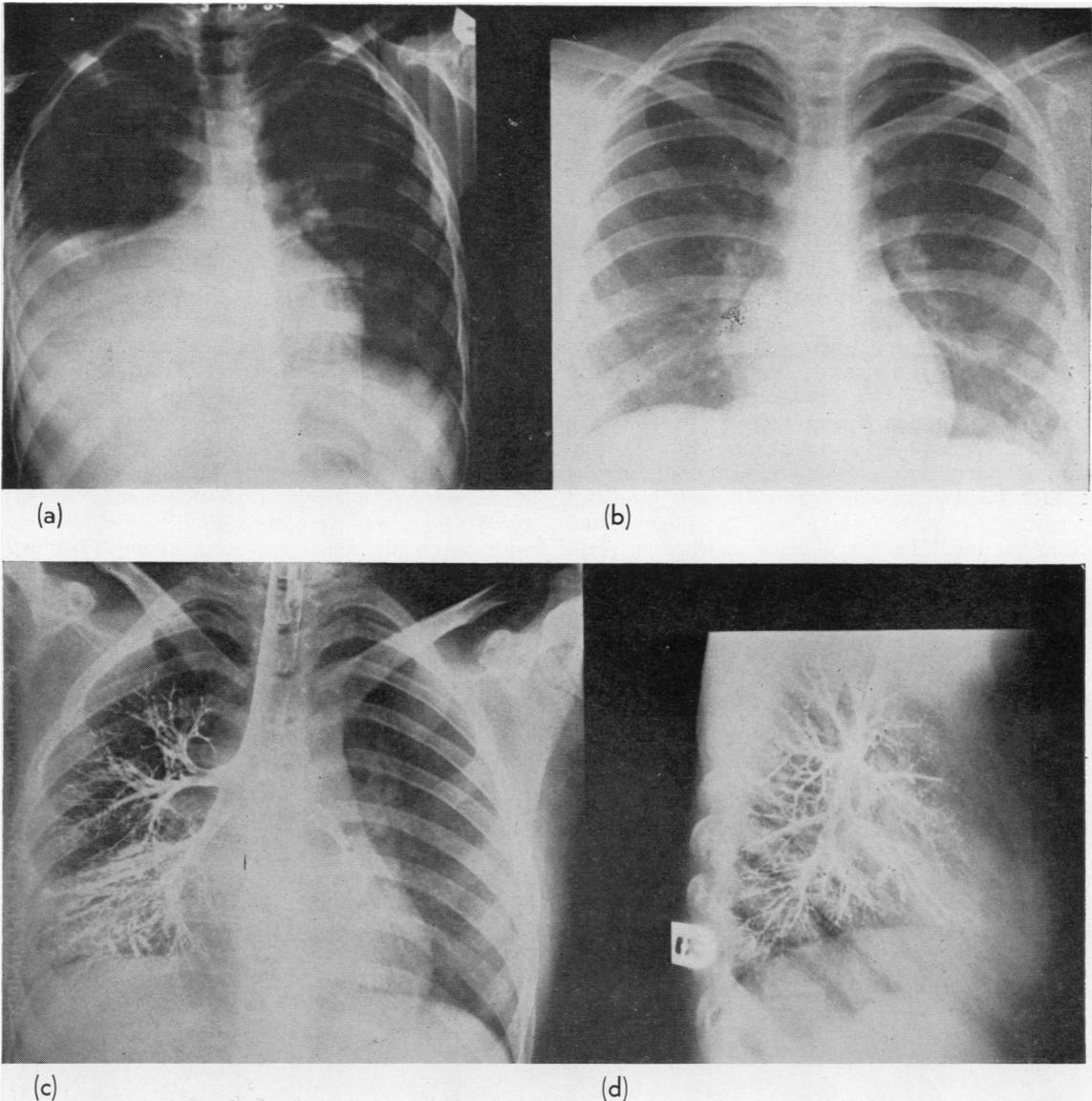


FIG. 4. In (a) the right middle and lower lobes are opaque and a little shrunken. A blade of timothy grass was removed from the intermediate bronchus eight days after it had been aspirated. Recovery was uneventful and a subsequent chest film (b) is normal. Bronchography subsequently showed bronchiectasis of the middle lobe (c and d), but the child was without respiratory symptoms and no further action was taken (case 23).

gram showed the left lower bronchi to be abnormal (Fig. 3 a-d). Because the child has remained free from respiratory symptoms during the five years of observation subsequent to the removal of the foreign body, lobectomy has not been undertaken. The opportunity does not arise before removal of an intrabronchial foreign body to assess

by bronchography the state of the bronchi distal to the obstruction. Where it is necessary, therefore, to remove a foreign body by bronchotomy it is unwise to resect lung distal to the obstruction unless the foreign body has been retained for many months and the lung is obviously destroyed, an assessment difficult to make at the time of thora-

cotomy. Although bronchiectasis has been demonstrated distal to a vegetable foreign body retained for only eight days (case 23) (Fig. 4 a-d), this is unusual, and it is more common for bronchi to look bronchographically normal and for the patient to be free from respiratory symptoms even when a foreign body has been present for a fortnight or more, and particularly if the foreign body was not of the softer vegetable variety.

The vegetable foreign bodies, three peanuts, a pea, a juniper twig, and a blade of timothy grass, and five pieces of bone were all associated with distal pulmonary shrinkage. The softer vegetable materials swell when wet and are irritating to the bronchial mucosa; bronchial obstruction is therefore quickly rendered complete. With relatively inert foreign bodies such as teeth, which by their shape do not occlude a bronchus, obstruction is completed only when secretions achieve such a quality that they are no longer propelled proximally past the foreign body by coughing and ciliary action. The five patients in whom a piece of bone was found in a bronchus all remembered a choking episode during a meal, and all had pulmonary shrinkage distal to the foreign body. In three of these five, the foreign body had been retained for a long period and a subsequent bronchogram was abnormal (Figs. 5 and 6). Age and paucity of symptoms of bronchiectasis made resection of the abnormal segments unnecessary in

two patients. Middle and lower lobectomy relieved severe symptoms in the patient whose films are shown in Fig. 6 (case 16).

The dental reamer (case 25) (Fig. 7) had fallen heavy end first into a right basal bronchus and could not be seen at bronchoscopy or felt with a grasping forceps introduced distally beyond vision. It was removed at bronchotomy. Whether or not it was necessary, on purely surgical grounds, to remove this small foreign body, the circumstances of its inhalation made its removal essential for both patient and dentist.

Of the intrabronchial foreign bodies, 18 were in the right bronchi and seven were in the left, and this right-sided preponderance is usual because the right stem bronchus is a little wider and a more direct continuation of the trachea than the left. In three of the 25 patients bronchotomy was required, and in five a subsequent bronchogram was abnormal. Recovery from the removal of the foreign body was uneventful in all, and in the five with bronchiectasis symptoms have justified pulmonary resection in only one.

INTRAPULMONARY FOREIGN BODIES

The lung is surprisingly tolerant of transgression by, and retention within it of, foreign bodies. Credulity is perhaps a little strained, however, in accepting the aphorism that, if to be shot is un-

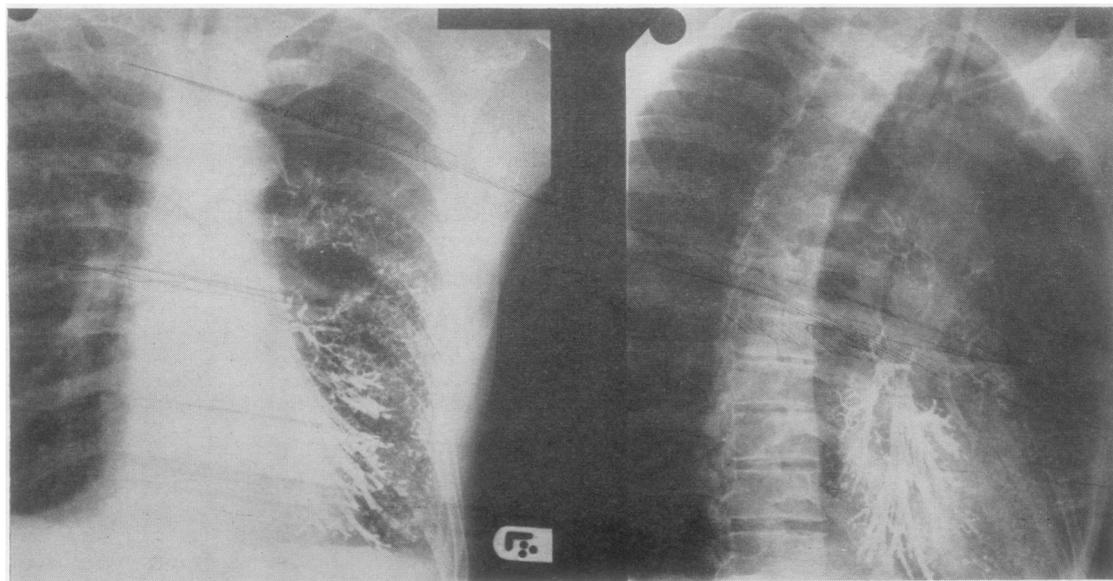


FIG. 5. These radiographs show left basal segmental bronchiectasis in a patient from whose left lower bronchus a fragment of bone had been removed after being retained for 12 years (case 17).

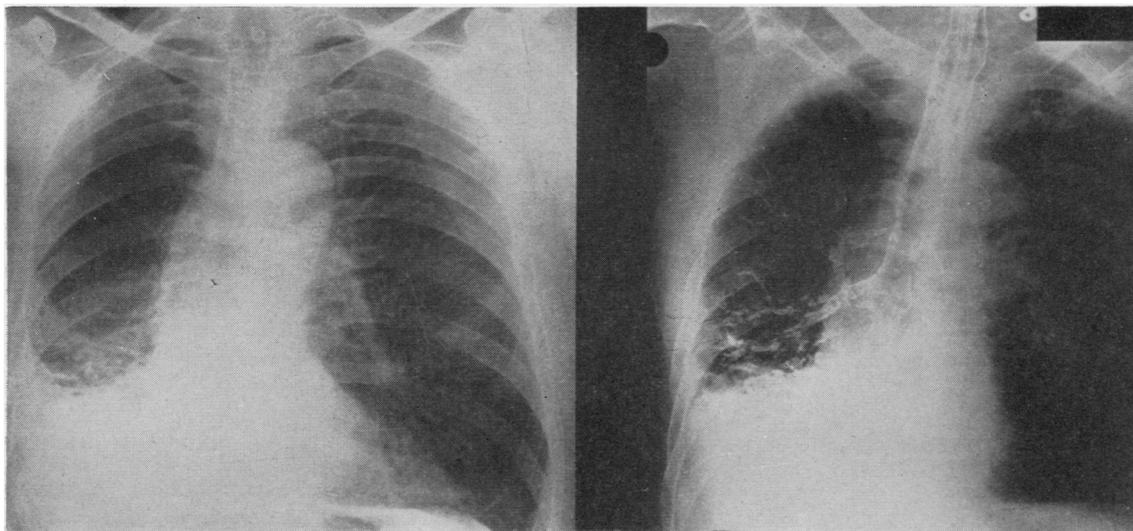


FIG. 6. Severe respiratory symptoms were relieved by middle and lower lobectomy in the patient whose radiographs are shown here. A fragment of bone had been removed from the lower part of the right main bronchus (case 16).

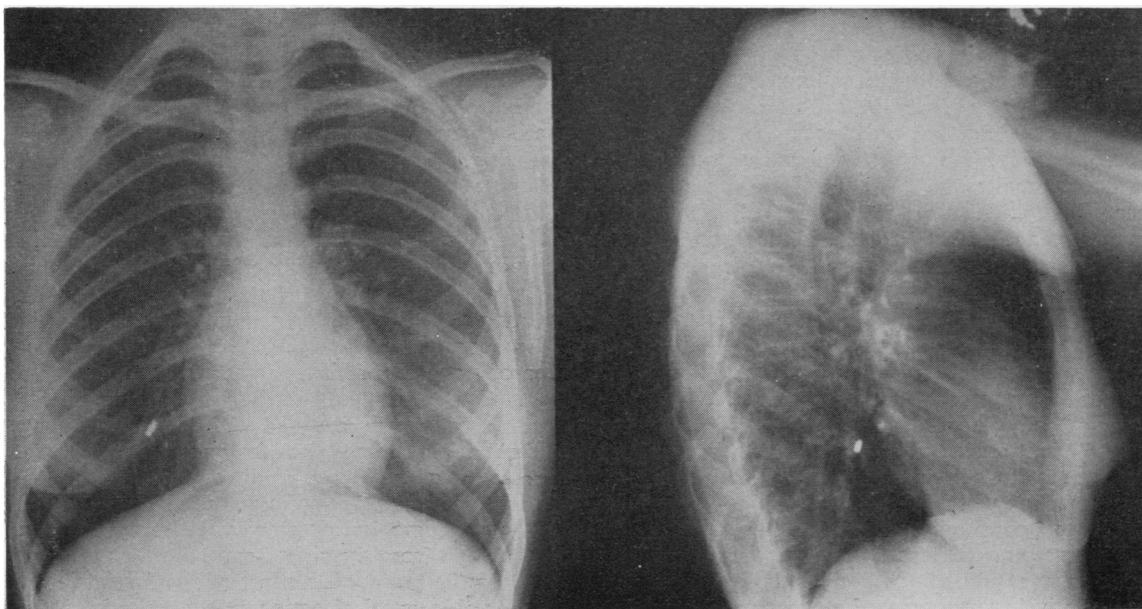


FIG. 7. A dental reamer has fallen, heavy end first, into the right posterior basal bronchus; the foreign body was removed by bronchotomy because it could be neither seen nor felt at bronchoscopy (case 25).

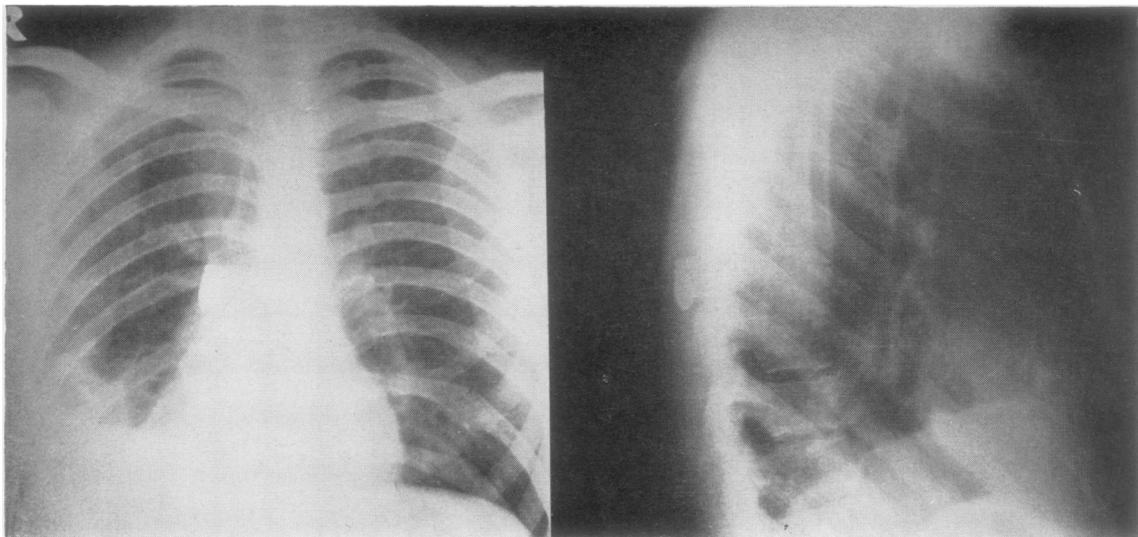


FIG. 8. *The bullet seen in these two films had entered anteriorly, and there was a right haemothorax; the bullet is seen in the lateral film to lie posteriorly and subcutaneously.*

avoidable, it is preferable to be shot in the chest and especially in the right half of the chest. In the management of all retained intrapulmonary foreign bodies, accurate localization of the foreign body is essential, and the least that is required is a pair of radiographs made in two planes at right angles. Furthermore, if it is considered desirable to remove the foreign body, a bronchogram is necessary so that the broncho-pulmonary segment in which the foreign body lies can be accurately identified. A surgeon has only once to fail to find a foreign body, inaccurately localized pre-operatively, to realize how small a foreign body may seem in relation to the viscus in which it is lodged. It is also desirable to have available radiographic control at the time of thoracotomy. The value of chest radiographs in two planes is caricatured in Figure 8.

Of the many patients seen during the last 10 years with metallic fragments in the lungs, only four had symptoms that could be related to the foreign body; all four had recurrent haemoptyses of sufficient severity to necessitate removal of the fragments. In all, accurate identification of the segment in which the foreign body lay was achieved bronchographically (Fig. 9 a-d), and in all four, segmental resection was undertaken rather than enucleation of the foreign body because of the relatively large area of pulmonary destruction related to the metallic fragment, all of which lay in a chronic lung abscess. Of metallic intra-

pulmonary foreign bodies, it is probably only those that are very large or cause symptoms because they lie in an abscess that require removal.

Penetrating percutaneous pulmonary wounds are nearly always successfully managed conservatively, by closure of the cutaneous wounds, evacuation of air and blood from the pleural space, and prevention of pulmonary collapse by maintenance of bronchial patency, if necessary by bronchoscopy. The instrument that has caused a penetrating wound is rarely present at the time of the patient's admission to hospital. Marabel and Maloney (1963) suggest that the retention of such a transfixing foreign body may be advantageous to the patient because the foreign body acts as a tampon, and removal under surgical conditions may allow satisfactory management of brisk haemorrhage and tension pneumothorax which in other circumstances could prove fatal. The infliction of stab wounds is a common activity in some parts of the world, and yet it is rare for the instrument used to be retained by the patient long enough for its removal under surgical conditions. The series of radiographs illustrated (Fig. 10 a-f) shows the development of a pulmonary and pleural or extrapleural haematoma after removal of a knife blade from the right hemithorax, and in this instance the tamponing effect of the foreign body is clear. No surgical action was required for the management of the haematoma. From a considerable personal experience of the management of

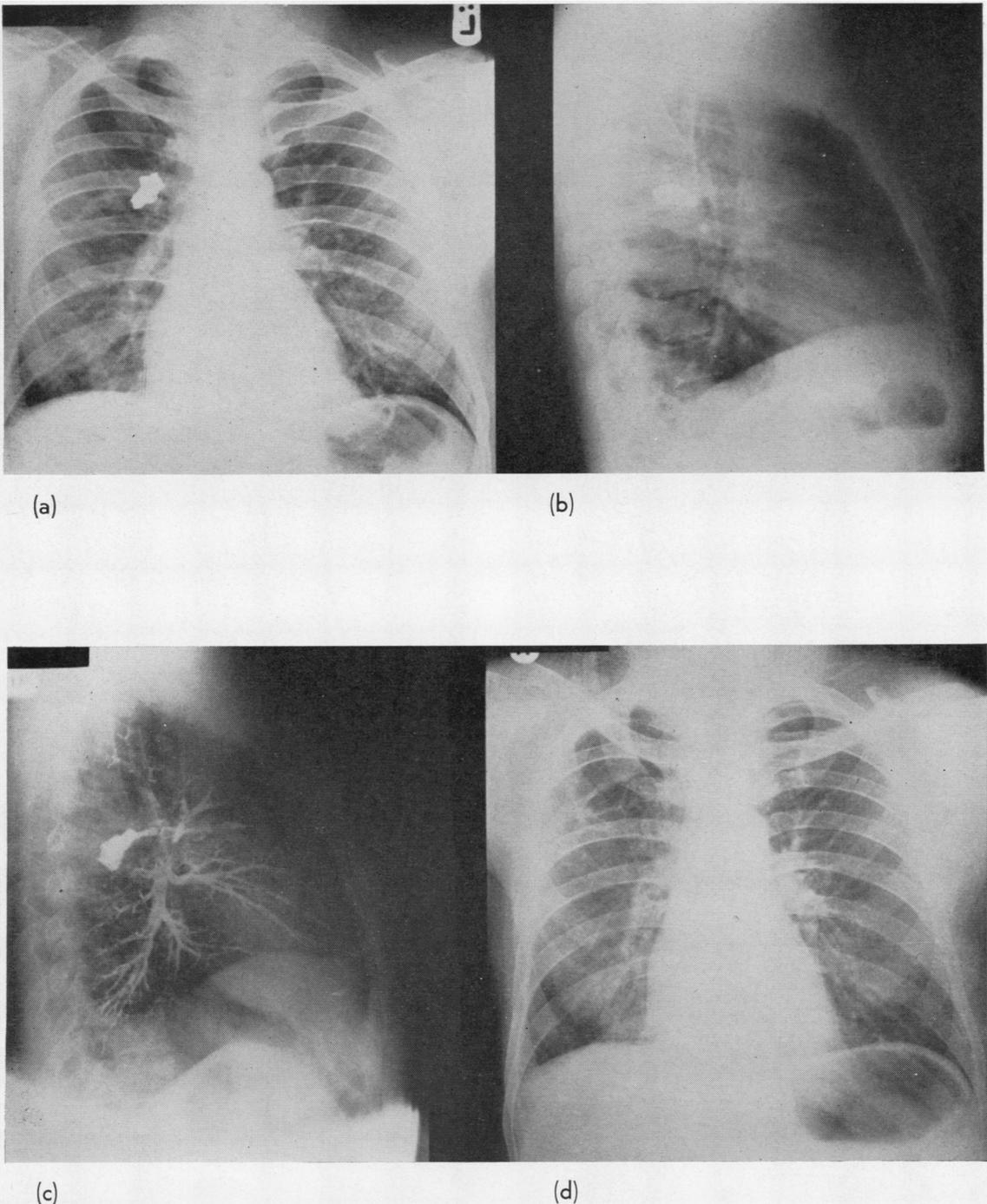
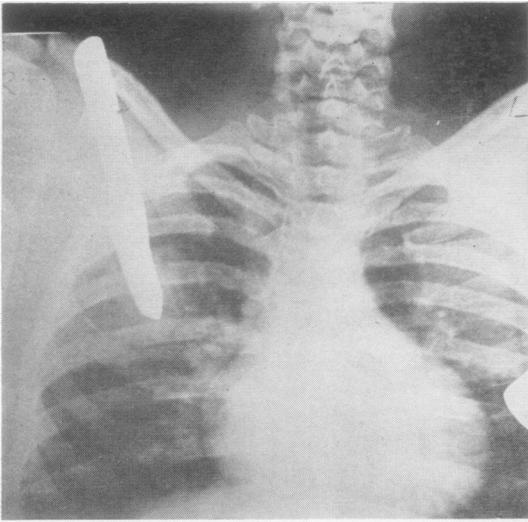
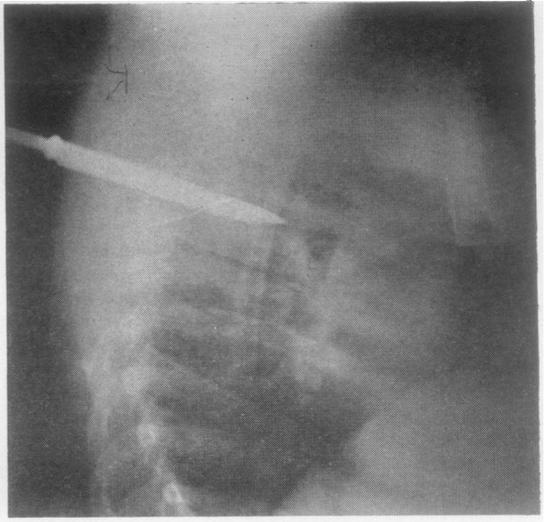


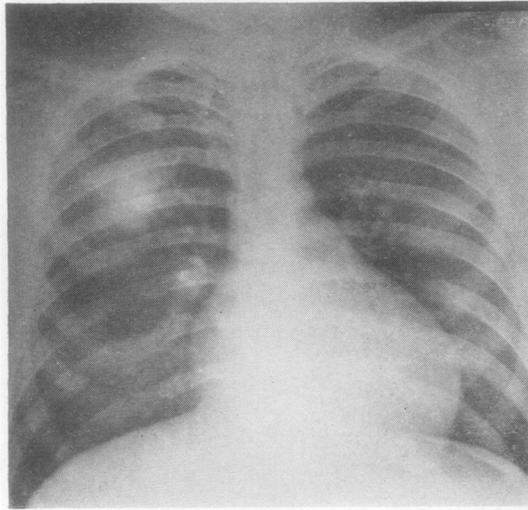
FIG. 9. *The metallic fragment in the right posterior segment (a, b, c) was responsible for recurrent brisk haemoptyses. Accurate localization was achieved pre-operatively by bronchography (c), and a film made some time after right posterior segmental resection is shown (d) (case 26).*



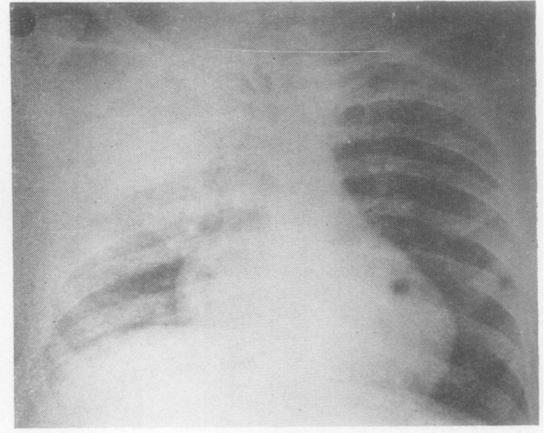
(a)



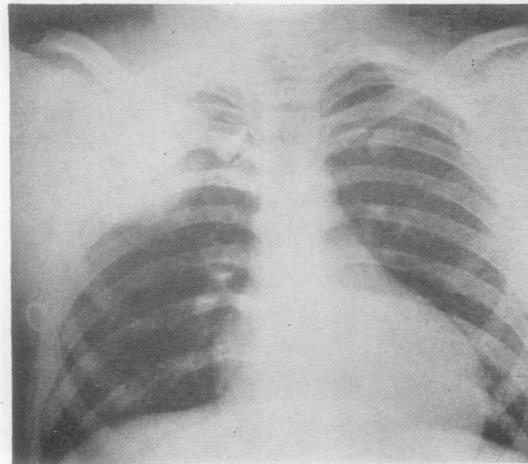
(b)



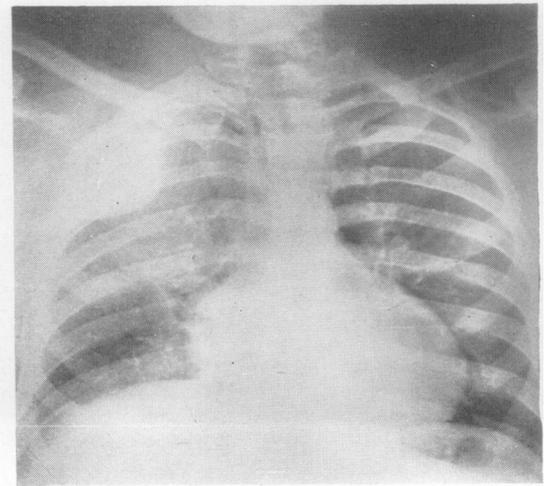
(c)



(d)



(e)



(f)

FIG. 10 (opposite). A sharpened table knife was thrust into the cephalad end of the right scapulo-vertebral interval (a and b). The assault took place in a prison, where the desire not to become involved in the affairs of others is usual, and this may account for the fact that the knife was not removed; the patient was entirely undisturbed. Three hours after the assault the knife was removed, with the patient anaesthetized, preparations having been made for thoracotomy. Radiographs were made within five minutes of removal of the knife (c), an hour later (d), five hours later (e), and the next day (f). At no time was the patient disturbed; small haemoptyses had preceded removal of the knife but did not recur after its extraction. The opacity had disappeared six weeks later. The absence of pneumothorax is remarkable and suggests that the pleural space was obliterated; there was no history of previous respiratory infection. It is not possible to state whether the haematoma was pleural or extrapleural (case 30).

INTRAPLEURAL FOREIGN BODIES

The pleural space is as intolerant of foreign bodies as the lung is tolerant, and the management of intrapleural foreign bodies is usually that of empyema thoracis, in the treatment of which the possibility of retention of a foreign body must be particularly remembered as a cause of chronicity. It remains a disquieting fact that the commonest foreign body in an empyema is a retained drainage tube, an example of which is illustrated (Fig. 11). To leave a surgical swab in a patient is negligent, and probably culpably so; but to delay recognition of this error, because the swab does not contain a radio-opaque strand, is lunacy (Fig. 12).

OE SOPHAGEAL FOREIGN BODIES

stab injuries to the chest, important damage is more consistently inflicted by a sharpened bicycle spoke than by a knife, probably because a bicycle spoke is usually longer than a knife blade and, being narrower, is also less easily deflected or obstructed by rib. The individual who deliberately sharpens a bicycle spoke is perhaps also more likely to make a determined and pre-meditated thrust with his instrument than is the individual who habitually carries a clasp-knife, the blade of which is seldom more than five inches long.

In four of the five patients in whom coins were retained in the oesophagus, removal of the coin at oesophagoscopy was followed by an uneventful recovery. In one (case 39), the coin had been retained in the oesophagus for a year. Discomfort at the time of swallowing the coin was brief, and the boy denied symptoms until the day before admission when he vomited blood. The coin was identified radiographically, lay at the level of the aortic arch, and at oesophagoscopy was seen partly to lie within the oesophageal lumen and partly to

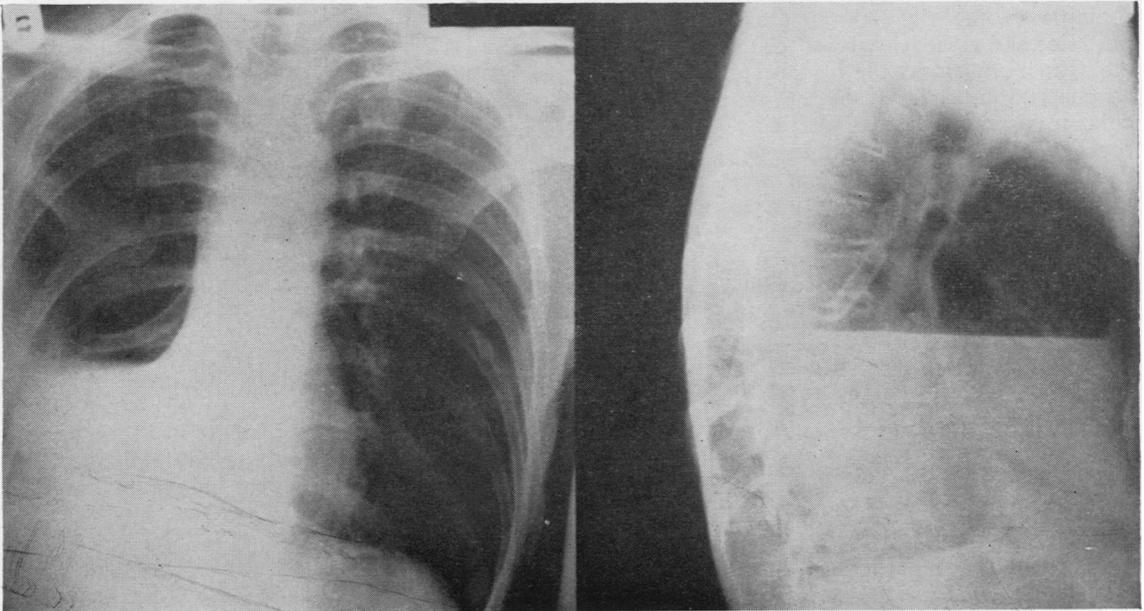


FIG. 11. A rubber drainage tube, faintly radio-opaque, has fallen into a large, drained empyema, and the cutaneous wound has sealed, so that there is a fluid level in the empyema space (case 33).

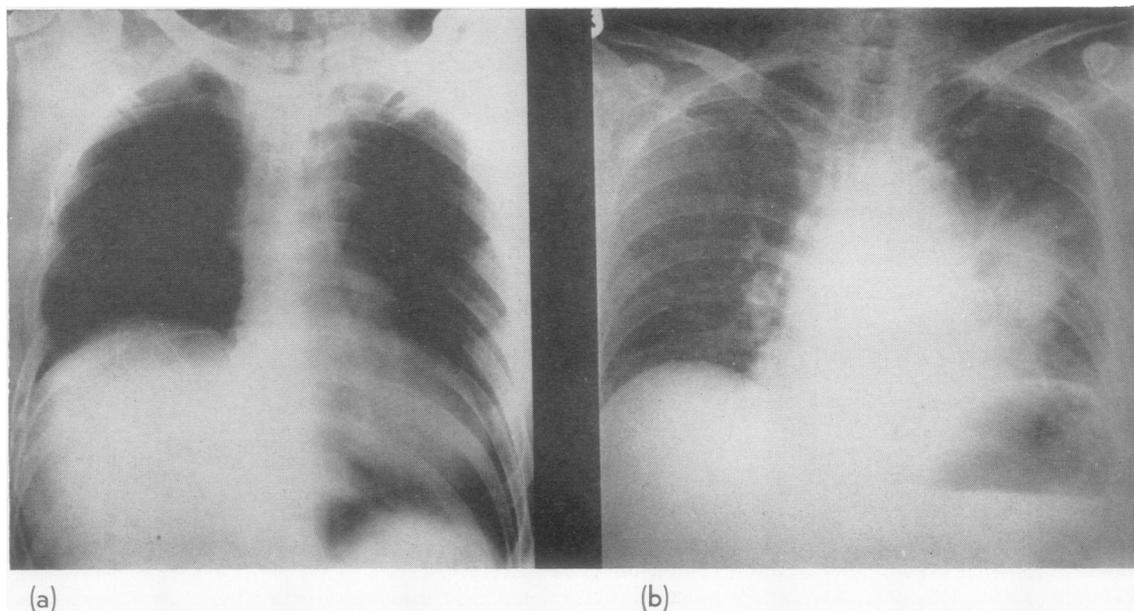


FIG. 12. (a) The radio-opaque strand is incorporated in a swab left in the pleural space after right pneumonectomy; the swab lies in a costophrenic angle and is partly obscured by the diaphragm. Before the patient had left the operating theatre it was recognized that a swab was missing and this radiograph was made; the wound was re-opened and the swab removed. In the patient whose film is (b), exploratory left thoracotomy for bronchial carcinoma, which proved irresectable, had been complicated by considerable haemorrhage. This film was made on the first post-operative day, and in it the radio-opaque strand incorporated in a surgical swab can be seen at the left heart border. The swab was removed and recovery from thoracotomy was uneventful (cases 31 and 32).

prolapse to the right through an ulcer in the posterior and right lateral wall of the oesophagus. At right thoracotomy the mediastinal abscess was approached by division of the azygos vein, the coin was removed, and the oesophageal wall repaired. The boy died 24 hours later from massive haemorrhage, the source of which was shown at necropsy to be an eroded intercostal vessel in the floor of the oesophageal ulcer.

The influence of emotion on oesophageal motility is well known, and cases 40 to 43 are examples of oesophageal spasm induced by emotional stress. Two of these cases are detailed below; the other two were similar.

CASE 40 A coal-miner narrowly escaped injury when an explosive charge was prematurely detonated. At the time he believed himself to be emotionally insignificantly disturbed. On the same day at the evening meal he recounted his experience to his wife. The first mouthfuls of food had been swallowed normally when a mouthful of meat became lodged in his 'throat', and thereafter he had total dysphagia. At oesophagoscopy 18 hours later a large bolus of meat was disimpacted from the distal oesophagus. Dysphagia has not recurred, and he is well 10 years after the episode described. The barium series is normal.

CASE 41 A young man without previous symptoms was eating a meal of liver, half way through which he was startled in the act of swallowing by the ringing of the door bell. For a week after this episode he was able to swallow only liquids, and, when examined fluoroscopically with both gastrograffin and barium, an oesophageal abnormality could not be recognized. At oesophagoscopy a large bolus of liver lay in the oesophageal lumen at the level of the aortic arch. The obstructing mass was broken up and some of it removed for identification. Swallowing was subsequently normal and has remained so.

In the investigation of dysphagia oesophagoscopy is essential; failure to identify an oesophageal abnormality with barium does not relieve the surgeon of the need to undertake direct visual examination of the oesophagus in every patient with dysphagia (see case 41 above). Neither of the two dental plates which had lodged in the oesophagus (cases 44 and 45) was radio-opaque, and in neither case was fluoroscopy with barium helpful. In neither was it necessary to fragment the plate to facilitate its removal.

It seems remarkable that it should be permissible to leave deliberately in a patient, temporarily or permanently, solid foreign material which is

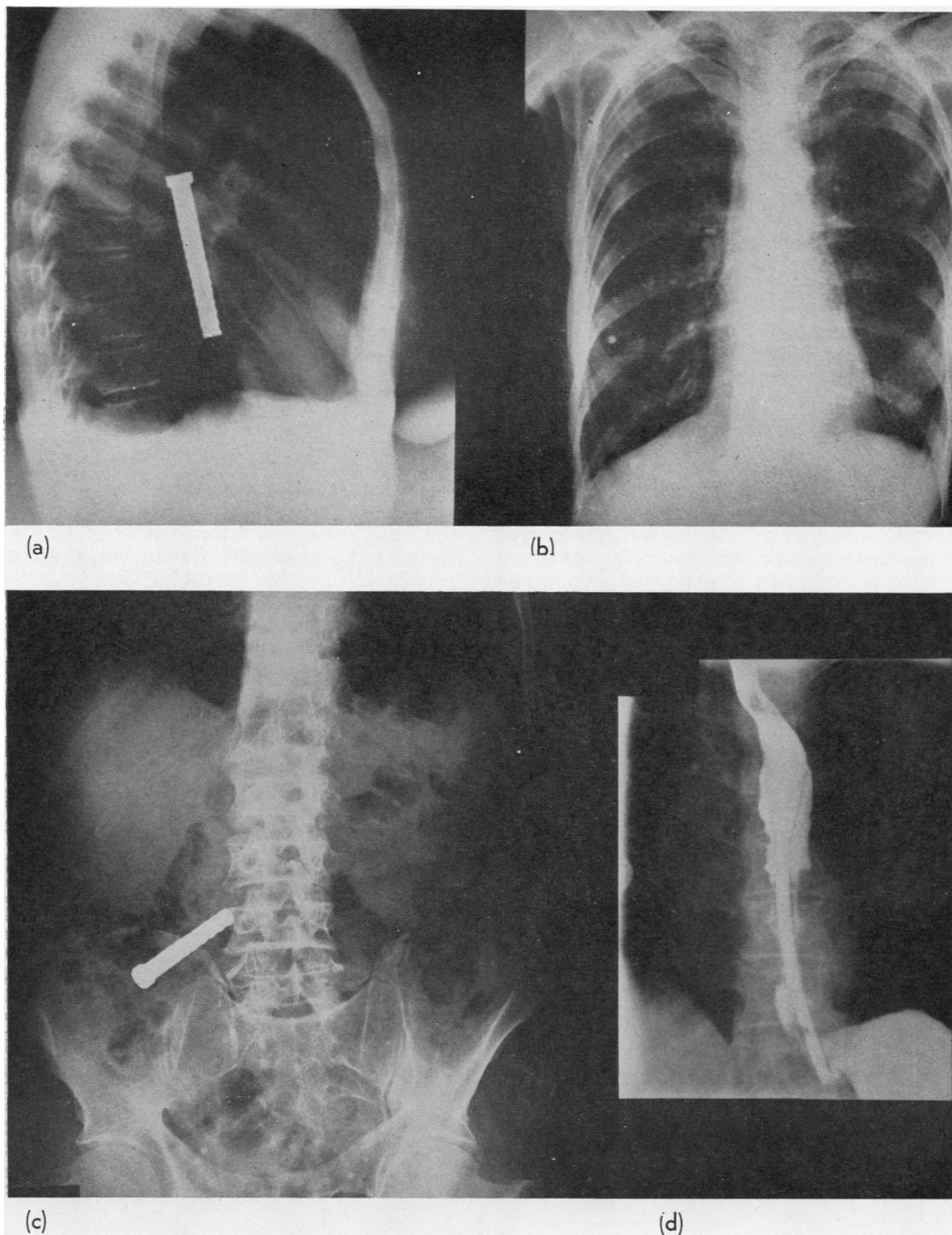


FIG. 13. *The Souttar's tube inserted through an oesophageal carcinoma (a) has passed distally in (b) and (c) to lodge at the ileo-caecal valve, where it later caused intestinal obstruction, which was relieved at laparotomy. It is only when barium is given that the plastic variety of oesophageal tube can be seen radiographically by its translucency (d).*

both mobile and radio-translucent, *i.e.*, dentures, tooth crowns, oesophageal tubes, intravenous plastic catheters, urethral catheters, and so on. The price of all these materials is increased by making them radio-opaque. Dentists have to pay mechanics who make dentures for them, and for the materials used, unlike surgeons, whose materials are supplied to them by the National Health Service, and it is arguable that a dentist should use a satisfactory cheaper material, since accidents are rare. If radio-opaque dentures are to be made routinely there must be legislation to enforce this, or the price of radio-opaque material must be competitive, and the same applies to plastic materials, rubber tubes, etc. A tube was recently offered for drainage of the pleural space after thoracotomy. The tube was beautifully designed, and in it was incorporated a clearly visible radio-opaque strand, but the price of the tube was more than 15 times that of the faintly radio-opaque rubber tubing routinely used for the purpose of draining the pleural space after thoracotomy. Radio-translucency is occasionally a specific prerequisite of a material; *e.g.*, acrylic resin, used to replace chest wall defects, is radio-translucent by design to facilitate chest radiography, but the material is always well secured. Until such time as there is proper legislation which prevents manufacturers from casually offering

radio-translucent materials for retention in patients, and dentists and surgeons from using such materials, the dentist or surgeon who leaves foreign material in a patient should not only ask himself whether the material is clean and safe but also whether, if it is lost, it can be found. The distal passage of a Souttar's tube is illustrated in Fig. 13 (a-c). When this tube became impacted in the ileo-caecal valve it was easily recognized radiographically as the cause of intestinal obstruction. Plastic varieties of oesophageal tubes used to facilitate swallowing in patients with carcinoma of the oesophagus do not have the advantage of being radio-opaque and are therefore more dangerous (Fig. 13d).

CARDIAC FOREIGN BODIES

Only three foreign bodies in the heart have been encountered: the distal end of a cardiac catheter which had broken off in the chamber of the right atrium, and a needle and a bullet in the wall of the left ventricle. The removal of the end of the cardiac catheter from the right atrium did not present a technical problem. The tip of the right atrial appendage is usually easily reached through a left thoracotomy, and, since this patient required mitral valvulotomy, this and the removal of the

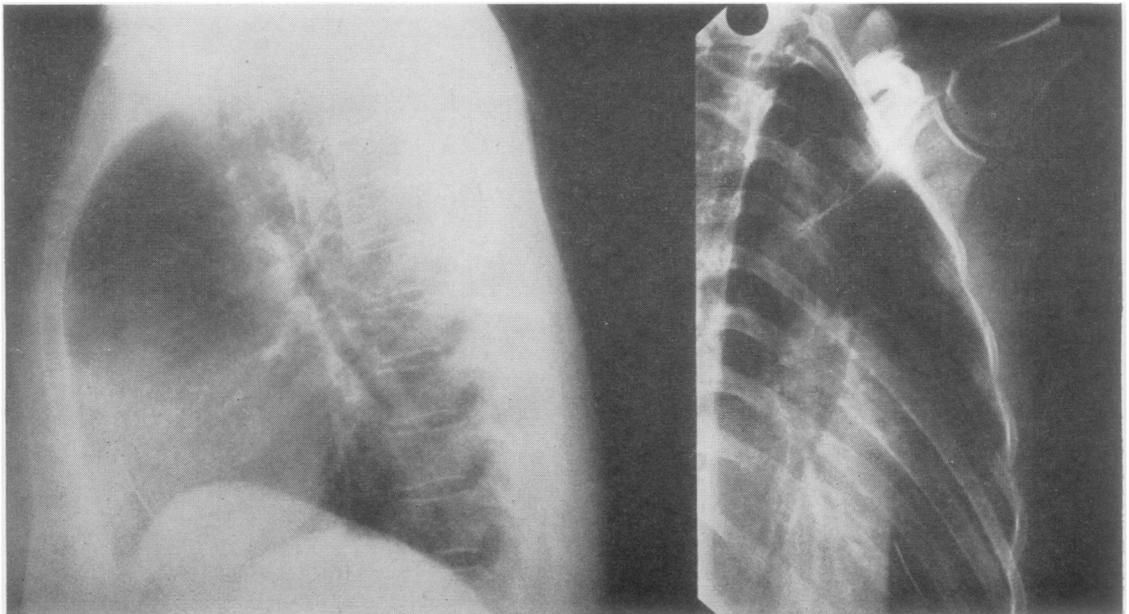


FIG. 14. A sewing needle in the wall of the left ventricle (case 49).

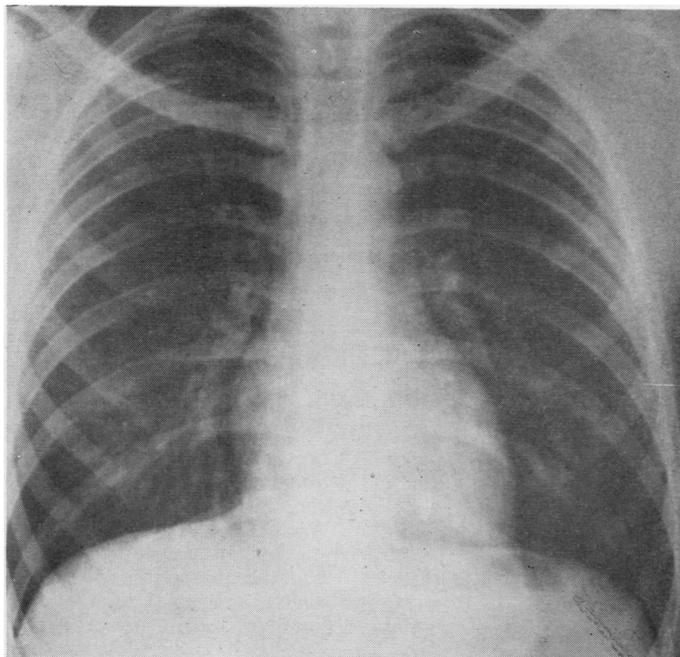


FIG. 15. A home-made bullet in or on the anterior wall of the left ventricle (case 50).

catheter tip were undertaken through this approach.

A mother put a sewing needle in the lapel of her jacket to lift a crying child and as she bent she felt a sharp stab in the anterior chest wall. Thereafter she could not find the needle. At fluoroscopy the needle (Fig. 14) moved with the left ventricle, from the wall of which it was removed at left thoracotomy. The site of entry was the second left anterior intercostal space.

To demonstrate the efficiency of a home-made cartridge a 15-year-old boy beat the percussion cap with a hammer. The lead slug lodged in or on the wall of the left ventricle. The boy was both physically and mentally unperturbed by the event, and an electrocardiogram was normal. The evidence of the site of the foreign body was radiographic (Fig. 15) and fluoroscopic. The bullet was not removed, and the boy is well seven years later.

SUMMARY

The results of management of 50 patients with intrathoracic foreign bodies are detailed. One patient died 24 hours after the removal of a coin which had been retained in the oesophagus for a year. A home-made bullet in the left ventricular wall was not removed because the patient was undisturbed. The foreign bodies were removed from the other 48 patients who are all well. Of 25 intrabronchial foreign bodies, 18 were right-sided, 22 were removed at bronchoscopy, and three at bronchotomy. The danger of leaving in a patient a mobile radio-translucent foreign body is emphasized.

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