A plea for early operation in cases of undoubted tubercle of the lung : part of the inaugural address to the Chelsea Clinical Society for the session 1899-1900 / by J. Foster Palmer.

A PLEA FOR EARLY OPERATION IN CASES OF UNDOUBTED TUBERCLE OF THE LUNG

Part of the Inaugural Address to the Chelsea Clinical Society for the Session 1899-1900

BY

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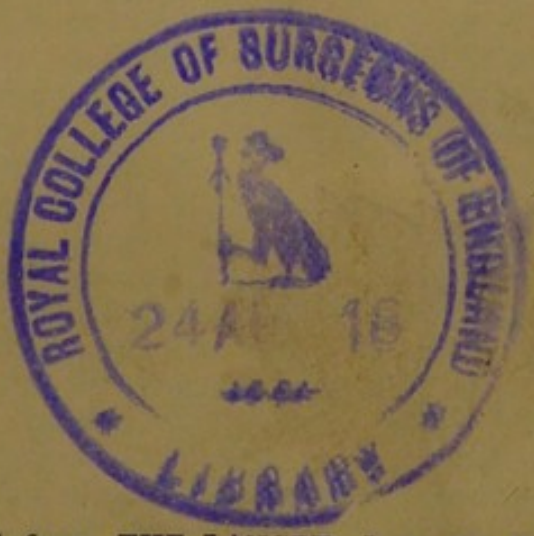

Reprinted from THE LANCET. June 23, 1900

A PLEA FOR EARLY OPERATION IN CASES OF UNDOUBTED TUBERCLE OF THE LUNG.

In bringing forward the following suggestions with respect to the excision of portions of lung tissue in cases of tubercle I am met by two special difficulties. The first is that which must inevitably arise of persuading any patient, feeling comparatively well and suffering only from a small patch of tubercle, to submit to a more or less formidable operation for its removal. The second arises from the same cause and consists in the absence of actual cases of operation of the special kind referred to. I must therefore base my observations, chiefly on anatomical considerations, on accidents affecting the lung tissue and on those somewhat rare cases in which operation on the lung has been found necessary for other and graver reasons. The difficulties will no doubt disappear as the public mind becomes more familiar with surgery, but this can only take place concurrently with its progress in the direction here indicated.

The prognosis of tuberculosis is always difficult, its medical treatment vague, empirical, and uncertain. It is only surgery which offers a really good prospect of success. Some may be disposed to question this, but the fact is in practice admitted, for when any other organ than the lung is attacked extirpation is the first remedy proposed and it is usually attended with success. Tubercle in the joints, tubercle in the glands, lymphatic or otherwise, in the bones and muscles, in the skin, in the abdomen and pelvis is successfully treated by operation, while the lungs—in which, after all, the

greatest havoc is wrought by this disease—remain practically unexplored by the surgeon's knife. The futility of all other treatment was recognised a hundred years ago by John Hunter. "Internal remedies," he said, speaking of scrofula, "have very little power."[1] "Local applications—especially those of a stimulating kind—all prove injurious."[2] "As to external parts, the only certain cure is extirpation."[3] "The best surgical treatment for those cases which will not admit of removal is to do nothing."[4] He finally emphasises his opinion by the statement that short of complete extirpation even "cutting always does harm."[5] In principle all these statements still hold good. In practice they mean something very different. Then they meant that most cases were incurable. Now they mean that most cases are curable. The area of surgery has enormously increased since Hunter's time. Indeed, it has been revolutionised. Then the cases that would admit of removal were few. Now the exceptions are few and surgical treatment is the rule. The principal exception, however, is just that region of the body where the greatest havoc is wrought by the disease. If "the only certain cure is extirpation"[6] extirpation ought to be universal, and our chief object should be to bring these great and highly susceptible organs within the scope of surgery. This does not mean the extinction of the physician. It means a development to the highest pitch of his accuracy of diagnosis, as well as of the observation of the bacteriologist and the skiagraphist, and of the thought, skill, and judgment of the surgeon. It is true now, as it was in Hunter's time, that "parts frequently get well of themselves." But it is equally true that still in some cases "the only certain cure is extirpation."[7] To decide which these cases are will tax all our powers of observation and diagnosis.[8]

The danger, generally speaking, of wounds of the lung is

[1] Works of John Hunter. Palmer's edition, vol. i., chapter xxi., p. 598.

[2] Ibid., p. 600. [3] Ibid., p. 598.

[4] Ibid., p. 600. [5] Ibid.

[6] Ibid., p. 598. [7] Ibid., p. 598.

[8] I am not referring now to the electric cautery, the "point de fer" treatment, as it is called. This is already on trial and has been employed, I believe, with some success, especially in Paris. I refer to genuine cutting operations with the knife, in cases where it may be necessary to remove bodily large or small portions of the lung, or in which the "point de fer" treatment is for any reason inadmissible or insufficient.

well known and has been recognised from the earliest times. πάγη δ' ἐν πνεύμονι χαλκός.[9] In this case death does not seem to have taken place until the abdomen was also ripped open with a sword. 3000 years ago it was understood that wounds of the lung were not immediately fatal.[10] The experiments of Professor A. Richet of Paris[11] on the living dog showed that the total collapse of one lung from opening the pleura caused a considerable degree of dyspnœa (suffocation he called it), but very rarely an immediate fatal result. In man, he says, the case is different: the sudden loss of so large a proportion of the breathing apparatus causes fatal suffocation.[12] He gives one case (from the "Bulletin de Thérapeutique," 1842, tome xxii., p. 358) in which death occurred several hours afterwards from an accident in which the pulmonary pleura was torn open and the lung collapsed; and another (from the "Archives de Médecine," 1840, tome ix., p. 489) in which death took place in three hours, when the right lung was found torn in three places and so collapsed as to be hardly visible. In this case the injured lung was normally the larger of the two.[13] On the other hand, Professor Longmore, in Holmes's "System of Surgery," in his article on Gunshot Wounds, states that "when the compression is limited to one lung, though it may be completely collapsed in consequence, especially if the opening in the chest wall be a large one, the symptom of dyspnœa may be wholly absent."[14] This, however, must be unusual. Indeed, all observers, both ancient and modern, are agreed

[9] Iliad, Δ 528.

[10] This fact has been emphasised more than it has ever been before by the large proportion of recoveries from wound of the lung among the troops now fighting in South Africa. The antiseptic treatment has given such wounds fair play and the opportunity of running their normal course, which in former wars they did not have. In them the deaths were evidently due, not to pneumothorax or emphysema or hæmorrhage, but to septic poisoning.

[11] Surgeon, when I attended his course in 1869–70, to the Hôpital des Cliniques, the special hospital in connexion with the École de Médecine.

[12] A. Richet: "Traité Pratique d'Anatomie Médico-Chirurgicale," 1866, p. 581: "Dans les expériences sur les animaux, sur les chiens, par exemple, la privation subite d'une moitié de l'appareil respiratoire détermine des suffocations qui n'entraînent que rarement une morte immédiate; mais il n'en est pas de même chez l'homme; cette brusque suppression d'une aussi notable partie d'une fonction si prochainement liée à la vie, entraîne des suffocations mortelles."

[13] Ibid., pp. 588 and 589.

[14] Holmes's "System of Surgery," second edition, vol. ii., p. 194.

that traumatic pneumothorax is a condition of great danger, though far less fatal than that resulting from ulceration of the pulmonary pleura from disease.[15] The traumatic form, too, when it affects only one side appears to be rarely fatal immediately. The danger is, *ceteris paribus*, in proportion to the degree of collapse.

This, then, is the most important danger in connexion with all operations involving the lung and pleura. The cause of this danger is an active and not a passive one. It was formerly taught that collapse of the lung in wounds of the chest-wall was due to atmospheric pressure. It is sufficiently obvious, however, that when the pulmonary pleura is intact and the parietal pleura opened the pulmonary pleura is subject to atmospheric pressure on both sides—on the outside through the hole in the chest-wall and on the inside through the trachea. These two are equal and contrary and as they must thus neutralise one another cannot either of them be adequate to cause collapse. There is evidently an active vital force at work also, and this is the retractility which is inherent in the elastic tissue of the lung and is one of the factors in ordinary expiration. The experiments of Richet on the dead subject proved this to demonstration. When the lung was healthy and free from adhesions collapse invariably took place on performing artificial respiration after making a subcutaneous incision into the lung by means of a tenotomy knife.[16] When congestion, or even emphysema, was present in the lung the retractility, of course, was incomplete.[17] But the principal condition which intervenes to prevent collapse of the lung is adhesion of the

[15] Vide, inter alia, Matas on Acute Traumatic Pneumothorax, Annals of Surgery, April, 1899; Brit. Med. Jour., 1899, vol. i., epitome, par. 343. Poland on Injuries of the Chest, Holmes's "System of Surgery," vol. ii., p. 589. Aitken's "Science and Practice of Medicine," vol. ii., p. 702.

[16] Richet: Traité Pratique d'Anatomie Médico-Chirurgicale, pp. 576, 577, 578, 579.

[17] Professor Osler ("Principles and Practice of Medicine," p. 608) appears to be of opinion, based on the experiments of West, that the cohesion between the two pleural surfaces is normally in excess of the elasticity of the lung and is thus in many cases sufficient to prevent collapse. He admits, however, that in some cases pneumothorax has even followed exploratory punctures with a hypodermic needle. It does not seem quite clear that in all these experiments, as in those recorded by Richet, the pleura was absolutely free from adhesions. If not it would explain the strange discrepancy between them and the cases last mentioned, in which adhesions were obviously absent.

pleural surfaces. The prevalence of this condition accounts no doubt for many of those cases of gunshot and other wounds of the lung which would otherwise be fatal.[18] In operations on the lung the same holds good. After all, what is the normal condition of the pleura, adherent or non-adherent? Adhesion is due to a morbid process and must therefore be pathological. But a process which after a certain age appears to have taken place in the majority of a species, and which tends to save life after operation or accident, if pathological, can hardly be considered abnormal or unnatural. A condition so prevalent, although apparently subject to no special rule, is anomalous on account of its extensive incidence and its protective influence in certain injuries. It is difficult to see why, important as pleuritic adhesions are in preventing collapse of the lung, all people should, as we suppose, be born without them and that a large proportion should subsequently develop them as a pathological condition. The statistics of their actual incidence it would be interesting to know. A good working majority might sometimes tend to justify an operation.

"Perhaps there is hardly one in fifty," said John Hunter, "who at the age of fifty is without adhesion of the lungs to the pleura."[19] If this is correct—and Hunter was a great dissector and an accurate observer—it looks well for operations on those over fifty years of age, but this is not the age at which we usually expect to meet with incipient tubercle, although it is by no means uncommon even at a much later age. In 1845 Richet, in making some researches on the lymphatics of the lungs, dissected 75 subjects. Of these 150 lungs 36 only were free from adhesions.[20] In this instance he was selecting healthy lungs as far as possible. Ordinarily the proportion of adherent pleuræ was much greater. "Pour mon compte," he says, "depuis plusieurs années que mon attention est attirée sur cette disposition, c'est à peine si j'ai rencontré un sujet sur deux dont les poumons fussent complètement libres dans la cavité

[18] One of the first, if not the first, to point out this fact was Roux in a paper in the Bibliothèque Médicale for 1807, entitled, "Sur les avantages de l'adhérence du poumon aux parois de la poitrine dans les plaies pénétrantes de cette cavité." The large percentage of recoveries from wound of the lung already referred to among the troops in South Africa is probably due in some degree to the prevalance of this condition.

[19] Surgical Works of John Hunter, Palmer's edition, vol. i., p. 442.

[20] Traité Pratique d'Anatomie Medico-Chirurgicale, p. 580.

pleurale."[21] These figures, however, as far as I have been able on a small scale to test them, seem to be hardly borne out by the experience of some of the more recent examinations. Of 283 cases recorded in the post-mortem book at St. George's Hospital for 1892, 149, or 52 per cent., appear to be free from adhesions or other affections of the pleura; 100, or 35 per cent., to present old adhesions; and 40, or 14 per cent., effusion or growths in the pleura. Of the 149 subjects with healthy pluræ 34, or 22·7 per cent., were over 50; of the 100 with old adhesions 34, or 34 per cent., were over 50; and of the 40 with present pleural mischief eight, or 20 per cent., were over 50. The average age of the cases free from adhesions was 38, of those with adhesions 39·8, and of those with recent effusion 34. The addition of phthisical cases, which are excluded from the hospital, but in which pleural adhesions are very largely prevalent, would perhaps raise the general incidence of this condition to more than 50 per cent.[22]

In operations of the lung where the pleura is free from adhesions pneumothorax, of course, is possible. Pneumothorax alone, however, and limited to one lung, is not by any means a necessarily fatal symptom. Phthisical cases (and these constitute nine-tenths of all cases in which the pulmonary pleura alone is perforated from disease) die from suppuration or spreading tuberculous mischief, but pneumothorax in an otherwise healthy person—and this includes traumatic cases—often ends in recovery.[23] Rarely indeed does death take place immediately. In the most severe cases recorded some hours have elapsed. It is evident, therefere, that in cases of operation, if a plan of treatment is decided on, there is ample time to carry it out and restore the parts to a more natural position long before fatal collapse ensues.

The first danger, then, to guard against in operations on the lung—and this is present only when the lung is practically free from adhesions—is pneumothorax. In wounds of the lung, however, it seems to be, from recent experience, a not very frequent condition. In his report of the battle of

[21] Ibid.

[22] The attendant at the Chelsea mortuary, who has assisted at all the post-mortem examinations for 11 years, gives me nine in ten as the proportion of adherent pleuræ, but this is only a cursory and unscientific observation and there are no statistics.

[23] Osler: Principles and Practice of Medicine, p. 610.

Tugela Mr. Treves gives, among numerous chest wounds resulting in surgical emphysema and hæmothorax, and a case or two of empyema, only one of pneumothorax.[24] In the report of the Spion Kop action he lumps together pneumothorax, hæmothorax, and empyema. Yet, "taken as a whole," he says, "this series of cases has done well."[25] Mr. Dent, in a report from Maritzburg on Feb. 10th, says that although "hæmothorax occurs pretty frequently" "pneumothorax" is rarely seen.[26] Sir William Thomson, writing from Cape Town on March 6th, says: "The penetrating bullet wounds of the thorax are numerous, but are all doing well."[27]

An experiment of John Hunter shows the natural tendency to heal of wounds in the lung and pleura. He shot a dog through the lung to see the process of suppuration in the pleura. "But," he says, "both nature and the dog cheated me, for ..... the dog would always lie on the wounded side. The lungs adhered to the wound and no further inflammation took place."[28] Notwithstanding the result in this case Hunter utters a strong warning against opening the pleural cavity even in cases of pneumothorax and surgical emphysema "because it will produce the suppurative inflammation all over the internal cavities and most probably make the wound in the lung ulcerate."[29] Meanwhile, surgery has made certain advances since the time of Hunter and suppuration is not now the universal bugbear which it was 100 years ago. The history of two recent cases of lung surgery will serve to show some of the possibilities in this direction. The first is a case related by Steiner of echinococcus of both lungs. The symptoms were those of disease of the liver and lungs with displaced heart and a loud murmur. On the left side the seventh and eighth ribs were resected at the back, the pleural

[24] Brit. Med. Jour., vol. i., 1900, p. 221.
[25] Ibid., p. 599. [26] Ibid., p. 663. [27] Ibid., p. 774.
[28] Works of John Hunter, Palmer's edition, vol. i., p. 444. Two striking cases of recovery from wounded lung are given in the "Annals of Surgery" for April, 1899. In one there was a perforating wound of the liver, kidney, diaphragm, and pleura by the shaft of a wagon. There appear to have been no (or only slight) adhesions, as a quart of blood mixed with bile and urine was removed from the pleural cavity. The other was a wound with a sharp instrument into the lung through the eighth intercostal space (Brit. Med. Jour., August 19th, 1899, Epitome of Current Literature, par. 135).
[29] Works of John Hunter, Palmer's edition, vol. i., p. 445.

cavity laid open, and the echinococcus removed. The lung immediately expanded and filled up the space formerly occupied by the echinococcus. In this case, which was that of a young girl, the operator, Professor Israel, did not trust to the existence of pleural adhesions but united the parietal to the pulmonary pleura by a circle of sutures round the tumour before operating. This is one certain method of avoiding collapse and pneumothorax. The patient recovered and the normal capacity of the lung was completely restored. The tumour on the left side came away through the bronchial tubes during an attack of broncho-pneumonia, but not without some permanent injury to the lung.[30] Surgical treatment, it seems, gave the best results. The second was a case of gangrene of the apex of the right lung operated on by Lejars at the Hôpital Beaujon. The patient was a man, aged 51 years, and, true to the dictum of John Hunter, the two layers of the pleura were adherent. Two inches of the second, third, and fourth ribs were resected in the subclavicular region. The lung was incised and a fœtid mass of filamentous tissue was extracted. The cavity was washed out with hot water, drainage-tubes were inserted, and the skin wound was closed and dressed with iodoform gauze. The operation was perfectly successful, but the patient died six weeks later from a second attack of gangrene, both lungs being infiltrated with tubercle. The opened cavity was healing.[31] It would seem that an early diagnosis of, and operation for, tubercle would have obviated all the mischief. An operation successful at this late stage and in such a condition of the lungs would, *a fortiori*, have been successful at an earlier period for the removal of tubercle at its first appearance.

Another method of preventing collapse and consequent pneumothorax is to excite adhesions artificially by irritating the layers of the pleura in the sound part of the lung beyond the seat of the mischief, thus blocking up that part of the cavity, leaving free, as far as possible, the tuberculous portion which it is intended to remove. This method, however, is objectionable on account of the well-known tendency of tubercle

[30] Centralblatt für Chirurgie, No. 1, 1898. Brit. Med. Jour., Jan. 22nd, 1898, Epitome of Current Medical Literature, par. 60.

[31] Bulletin et Mémoire de la Société Médicale des Hôpitaux de Paris, March 9th, 1899. Brit. Med. Jour., May 6th, 1899, Epitome of Current Medical Literature, par. 326.

to spread in the lung after any form of pleuritic inflammation. A fourth method has been suggested by Matas in the paper already referred to.[32] His plan is to keep the lung inflated by continuing artificial respiration throughout the operation. This is done by means of a pair of bellows in connexion with an O'Dwyer's intubation tube passed into the trachea. This appears to be free from most of the objections which attend other methods and where there are no adhesions leaves the whole lung free both for exploration and for any operative proceedings that may be found necessary. By one or other of the above methods the danger of pneumothorax and collapse of the lung may be almost certainly avoided in pulmonary surgery. These methods are: (1) to sew the pulmonary to the costal pleura beyond the seat of the disease before operating; (2) to trust in certain cases to the existence of adhesions already formed if the physical signs give evidence of it; (3) to excite artificial adhesions in the pleura; and (4) to expand the lungs artificially from within. The last appears to offer the best prospect of success and can, moreover, be discontinued if extensive adhesions are found to be present.

The second danger is surgical emphysema. It is said that this condition may be fatal from its effect on the muscles of respiration or even from pressure on the phrenic nerve. Emphysema may result from four causes: (1) rupture of the trachea or larger bronchial tubes; (2) external wounds into the cellular tissues surrounding the costal pleura without lesion of the latter; (3) lesion of the costal pleura only with external wound; and (4) lesion of both pleuræ with or without external wound. The first two have no bearing on the subject. The last two are also causes of pneumothorax. Richet is of opinion that pneumothorax and emphysema do not usually occur together.[33] The air escaping from the lung into the cavity of the pleura would, it is argued, take the line of least resistance. This would be that of compressing the lung rather than of penetrating into the cellular tissue. When, however, the lung is fully collapsed there is no more alternate contraction and expansion and consequently no further escape of air into the pleural cavity.

[32] Annals of Surgery, April, 1899. Brit. Med. Jour., May 13th, 1899, Epitome of Current Medical Literature, par. 343.

[33] This is, of course, in reference to cases where the air comes from the lung only.

He considers that emphysema usually indicates *partial* adhesion. In this case the air escapes into the pleural cavity and, being unable to compress the lung on account of adhesion, penetrates into the cellular tissue. This, of course, would only occur when the external wound is small or non-existent. If it were large (as it would be in the case of an operation) the air would escape through it and emphysema would not occur. In a case under my care, however, occurring in a child in whom adhesions would presumably be absent, emphysema took place over the chest, the neck, and the face.[34] The child, however, recovered rapidly and completely without any further symptom, and my opinion from cases I have seen, confirmed by the experience of the war in South Africa, is that emphysema is not necessarily, when uncomplicated, a particularly dangerous symptom. When the pulmonary pleura is intact the case is different. In Mr. Turner's case of rupture of the œsophagus at the Royal Medical and Chirurgical Society emphysema extended over the chest, neck, and face, and the lung was found to be totally collapsed.[35] It is doubtful, however, even in these cases whether the infiltration continues much after the collapse of the lung, as the suction of air through the external wound would then be much less powerful. In operations on the lung the conditions of emphysema should not occur. During the operation it is prevented by the free escape of air through the wound, while after the operation the entrance of air from without is prevented by its closure. From the experience of penetrating wounds at the seat of war the danger does not seem to be great. Sir William Thomson (March 6th) speaks of aspirating in some cases for hæmothorax but does not mention either emphysema or pneumothorax. Mr. Treves (Tugela) gives it (emphysema) as an occasional symptom, but the cases do well generally. At Spion Kop he gives pneumothorax, hæmothorax, and empyema, but no emphysema, while Mr. Dent (Feb. 10th), who refers to hæmothorax as common and pneumothorax as rare, makes no mention of emphysema at all.[36] In fact, surgical

[34] Reported in THE LANCET, Sept. 21st, 1878.

[35] Paper read before the society on May 27th, 1900. (Emphysema is very prevalent after this accident, probably on account of accompanying rupture of some of the larger bronchial tubes.)

[36] Brit. Med. Jour., vol. i., 1900, pp. 775, 221, 599, and 623.

emphysema requires for its production a combination of conditions, some of which are usually absent, and although in operations on the lung it is possible for it to occur during the period which elapses between the closing of the external skin wound and the healing or blocking up of the wounds in the pleuræ, it is, for all practical purposes, a "quantité négligeable."

The third, and not the least important, danger is hæmorrhage. The pulmonary tissue is rich in blood-vessels, but these vessels increase in volume as we approach the pedicle and diminish towards the pleura. Therefore, as Richet observes, "superficial wounds, however large, are rarely followed by abundant hæmorrhage."[37] The earlier, then, that a tubercle is excised the less would be the danger. The history of gunshot wounds, too, shows that even when they are extensive the hæmorrhage is by no means necessarily fatal and that there is a considerable tendency to coagulation in the thick venous blood which issues from the arteries and capillaries of the lung. Among Sir W. Thomson's cases hæmothorax was not uncommon, but they all did well after paracentesis, and this seems to be the usual experience. In many other cases a single hæmoptysis was the only symptom, showing the natural tendency to a rapid cessation of hæmorrhage. In Israel's case the pulmonary pleura was possibly left intact, or wounded only to a very small extent. The question of hæmorrhage, therefore, did not arise. In Lejars's case the lung (or pulmonary pleura) was incised to a considerable extent, but here again hæmorrhage was presumably absent by reason of the morbid processes which had been going on in this part of the lung. Indeed, there is no mention of hæmorrhage. In cases where a cutting operation is required at the apex of the lung, and no adhesions are present, the diseased part, if not too extensive, might be included in a single ligature and the whole excised. In other superficial parts the same could be accomplished by drawing out the diseased part through the opening in the chest-wall with hooks or forceps. Where the disease is deeper or more extensive ligatures can be applied, after removal of the diseased portion of lung, to the larger vessels, the ligature in each case including the bronchial tube, with its accompanying artery and vein. In the first two classes of cases the most efficient method, perhaps, of preventing

[37] Traité Pratique, p. 591.

hæmorrhage would be by operating with the electric ecraseur. In the last the electric cautery could be applied after the use of the knife. In all the application of iodoform would be a useful adjunct, both as an antiseptic and a hæmostatic.

In all operations on the lung the introduction of bacteria from without, through the wound in the chest-wall, can be effectually prevented by modern antiseptic methods. But there is in these cases another channel of entrance for bacteria—viz., the trachea and bronchial tubes. The general experience of internal wounds of the lung where the skin is intact points to the pneumococcus as most to be feared in this direction. Pneumonia is the most frequent complication of rupture of the lung and the wounds caused by fractured ribs, injuries in which the trachea is the only passage for microbes, and which resemble in this respect operations on the lung with the external opening in the chest-wall hermetically sealed.

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Printed at the Lancet Office, 423, Strand, W.C.