Needless to say, in every catheterisation complete regard to asepsis must be employed.

Blockage of the urethra by calculus, pedunculated vesical growths, calculus, foreign bodies or blood-clot should be relieved similarly by the passage of a catheter. A calculus or foreign body may cause a good deal of spasm in the urethra, but this can be overcome by the use of novocain. In cases in which the retention is due to the filling of the bladder by blood-clot, attempts should be made to break up the clot and extract it by means of a lithrotomy evacuator, but in these cases it is often better to proceed immediately to a suprapubic cystostomy, turn out the clot, and drain the bladder; the cause of the excessive hæmorrhage can then be treated at a future date.

With *enlarged prostate* retention of urine may occur from the increasing obstruction of the gland or from the increased congestion of the enlarging gland from excess of alcohol, exposure to cold, etc. In every case of retention in which there has been gradually increasing obstruction in the lower urinary passages, it must be ever borne in mind that there is very frequently interference with the full renal function from the gradually increasing intrarenal pressure, and it cannot be too strongly emphasised that in every such case the bladder must be emptied very slowly, as otherwise the sudden relief to the intrarenal pressure may cause such congestion of the renal tubules that complete and fatal anuria follows. Believe me, it is not by any means unusual to see a case in which a doctor has been called to see a case of retention and in which he tells us with some pride that he drew off 40, 50, or 80 ounces of urine, but that since then no more urine has been passed and there is none in the bladder.

Attempts should first be made to obtain voluntary micturition by means of a hot bath, belladonna suppositories, or hot enemata. Should these fail, a catheter must be passed with rigid asepsis and with great gentleness. It is best to try with a large Coudé catheter, size 18 or 20 French scale, first; smaller or pointed catheters are prone to be caught in folds in the prostatic urethra. If difficulty is found with the Coudé catheter a long, fully-curved prostatic metal catheter should be tried, or an English gum-elastic instrument used, the curve being increased whilst the catheter is in the urethra by withdrawing the stilette for two inches. Should catheterisation be found impossible, suprapubic puncture by means of a small trocar and cannula may be necessary. Where the catheter has been passed into the bladder, only a small quantity of urine should be withdrawn, say 10 or 15 ounces, when the catheter should be tied in and directions given that 4 to 5 ounces be drawn off every hour until the bladder is empty. The catheter should be kept in for several days and then withdrawn, and the patient encouraged to pass his urine naturally, but it may be necessary to replace the catheter and decision made as to the necessity for operation.

Stricture of the urethra may cause retention and may cause great difficulty in passing an instrument into the bladder. In the majority of cases the stricture is not very dense and the exciting cause of the retention is excess of alcohol or exposure to cold. In these cases a fairly large olivary-pointed catheter should be first tried and the position of the stricture ascertained. If this fails to pass through the stricture smaller sizes should be successively tried until one is passed through into the bladder. This should then be tied in and the urine allowed to trickle away slowly. Subsequently, larger sizes should be passed and the stricture gradually dilated. In other cases great difficulty may be experienced in passing any catheter and resource may have to be made to filiform bougies. A straight one should first be tried, failing which the point should be slightly bent and a further attempt made. It is often useful to inject warm oil into the urethra and to pass several filiform bougies into the canal down to the face of the stricture when one may be manipulated through. This should be then tied in and after a little time the urine will trickle alongside it. After a day or so the stricture will allow of dilatation by one of the usual methods. When complete failure has been the result of attempted passage of a bougie, an anæsthetic should be given, when a filiform may frequently be passed; in other cases a suprapubic puncture may be done or a Wheelhouse's external urethrotomy performed.

HÆMOPTYSIS.

BY

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WHEN a patient coughs up blood it is often taken for granted that he is consumptive. This is not wise, for hæmoptysis may result from a variety of causes. Pulmonary tuberculosis is, however, such an important cause that in this paper I propose to discuss the subject under two headings: (1) hæmoptysis of non-tuberculous origin; (2) of tuberculous origin.

HÆMOPTYSIS OF NON-TUBERCULOUS ORIGIN.

1. *Heart affections* and especially mitral stenosis may give rise to hæmoptysis which is often large and of frequent recurrence. In any case of hæmoptysis it is very important to examine the heart. Indeed, in all routine examinations of the chest it is a good rule first of all to find the position of the apex beat, and then to examine the heart before coming to the lungs. This practice will save many a mistake. It is surprising how often there is found in a tuberculous institution a case with so obvious a murmur that it could not have been overlooked had the heart been examined. In

the treatment of these cases one should remember that there is not the same objection to the use of morphia as in a case of tuberculosis.

2. *Aneurysm of the aorta* is a rare cause of hæmoptysis. If the aneurysm breaks through into a bronchus the hæmorrhage is rapidly fatal, but in some cases where there is pressure on a bronchus there may be small hæmoptyses recurring at intervals over a long period of time.

3. *Hæmorrhagic Infarction*.—This may occur after a surgical operation or confinement, but is most common in cases of valvular disease of the heart. Mild cases usually recover, but sudden death may occur from this cause, or there may be repeated infarctions which eventually prove fatal. I saw a patient recently who had pulmonary embolism after a simple abdominal operation. She recovered, but a few days later a second embolism occurred and then three more at intervals of a few days, and she died suddenly after the last one.

4. *Hæmoptysis* will also occur in cases of abscess or gangrene of lung. In these cases the diagnosis is not difficult and the treatment is to deal with the cause.

5. *Bronchiectasis* is usually associated with hæmoptysis. In 25 cases collected by Dr. Acland and verified by post-mortem examination, 80 per cent. had had some hæmoptysis and 28 per cent. as much as a pint or more. A dry form of bronchiectasis has been described characterised by recurrent attacks of hæmoptysis, but with no symptoms between the attacks. The diagnosis in these cases is made by X ray examination after the intratracheal injection of lipiodol.

6. *Chronic Bronchitis* does not as a rule lead to a profuse hæmoptysis but the sputum is often stained with blood. Indeed it is not common to find a long standing case of bronchitis in which there has never been any colour in the sputum.

7. In cases of *pneumonia* and other acute conditions of the respiratory tract there is often staining of the sputum, but it is rare to find more hæmorrhage than this.

8. *Neoplasm*.—In malignant disease of the lung there is usually some hæmoptysis, but not often much. In some cases hæmoptysis is the first symptom of a neoplasm. Non-malignant tumours may also give rise to hæmorrhage. I saw a woman last year who had repeated hæmoptyses as a result of a fibroma which was growing in a large bronchus. In this case the tumour was successfully removed through a bronchoscope.

9. *Hæmoptysis* of unknown origin. I think most of these are really cases of tuberculosis. Certainly hæmoptysis is by no means uncommon in arrested pulmonary tuberculosis. It is often very difficult to give advice in these cases, for although the patient may be perfectly well between the attacks the hæmorrhage when it does come may be alarmingly severe. It is quite obvious that a large hæmoptysis of some two pints cannot be prevented by drugs, nor should one keep a patient indefinitely under a drug to try to ward off an attack. Artificial

pneumothorax might prevent the attacks, but if they are at very distant intervals it is often not worth while to keep the lung collapsed. It is, however, the only treatment that is likely to be successful.

In one of my cases, a man had hæmoptysis in 1906 when he was 23. He had recurrent attacks at intervals of about a year until 1918 when they become more frequent. In 1921 he was having hæmoptyses up to half a pint every few weeks. In one month he had three attacks and he had been unable to work for some time. In March, 1921, artificial pneumothorax was induced on the right side, and he returned to work in May, 1921. When last seen in September, 1926, he was still at work and had had no more hæmoptysis. The lung was kept collapsed for 18 months.

In this case no signs were found either clinically or by X ray except during one of the attacks when a few crepitations were heard at the right base. In another case, which I think was almost certainly tuberculous although no tubercle bacilli were found in the sputum, the patient—a woman of 23—had repeated hæmoptyses. It was not clear from which lung the blood was coming as there were signs on both sides, but as the right lung seemed to have the oldest lesion it was collapsed. Five weeks later she had another large hæmoptysis, so the right lung was allowed to re-expand and the left one collapsed and she has had no further attacks of hæmoptysis.

Dr. Davidson¹ describes an interesting case of severe hæmoptysis of doubtful origin, and in such cases where tuberculosis and cardiac disease can be excluded he suggests an investigation in the following order: (1) complete clinical examination; (2) X ray examination; (3) X ray after the introduction of lipiodol; (4) bronchoscopy.

10. *Spirochaetosis*.—Cases of hæmorrhagic bronchitis due to spirochaetes have been described. The sputum is usually abundant and contains spirochaetes of the Vincent type.

11. Certain *rare conditions* may be associated with hæmoptysis. Syphilis of lung, hydatid or other parasites, actinomycosis and various mycotic infections are sometimes found to be the cause of the hæmoptysis. I have seen a case of pneumomycosis clear up with remarkable rapidity on large doses of potassium iodide.

HÆMOPTYSIS OF TUBERCULOUS ORIGIN.

* This may vary from mere staining of the sputum to a large fatal hæmoptysis. It has been said that patients do not die of hæmoptysis but after it, and certainly, although it is a most alarming symptom, it is very rarely fatal. A large hæmoptysis usually comes from a ruptured vessel or an aneurysm of the pulmonary artery in a cavity, a small one from capillary congestion. It must not be forgotten that the bleeding may be from the bronchial vessels and so from the systemic and not the pulmonary circulation. One must also remember that all the blood which leaves the left ventricle has to go through the right

¹ THE LANCET, Jan. 15th, 1927, p. 122.

heart and lungs. Pulmonary pressure is not of primary importance, since whether raised or lowered the same quantity of blood has to go through the pulmonary system. Treatment such as binding the limbs and thus diminishing the volume of blood in circulation is likely to be of more value than the administration of drugs to affect the blood pressure. Treatment, of course, depends on the severity of the case. As Osler pointed out, treatment which might do good in a case of congested mucosa would be as much out of place in hæmorrhage from a ruptured pulmonary aneurysm as in a cut radial artery. Hæmoptysis is always very terrifying to the patient, and the first and most essential thing to do is to reassure him. In order to calm a frightened patient and steady the heart morphia has been used. The physician should try, however, to calm the patient without narcotics, for by checking cough they tend to retain the blood in the bronchial tubes and so increase the danger of broncho-pneumonia. It is to prevent this complication that some physicians are opposed to putting the patient to bed, but allow him to walk about. In my opinion, however, bed is essential, and the patient should be kept there for at least three days after all staining has disappeared from the sputum. Here I would warn you against the possibility of doing harm, for even if one cannot stop the hæmorrhage one can at least avoid making it worse. Certain drugs are only useless, others are actually harmful. Ergot probably does harm, and drugs such as amyl nitrite almost certainly do so. Turpentine is poisonous unless given in such small doses that it has no effect at all. Cold drinks or sucking ice dilate the pulmonary vessels and increase the hæmorrhage. Hot drinks cause constriction of the pulmonary vessels, but should also be avoided on account of their stimulant effect. The patient should be put to bed, not lying flat but propped up with pillows. Everything should be done to steady the heart and circulation, excitement must be avoided, diet should be light with only a small amount of liquid, and no stimulants, and the bowels should be kept open. An icebag applied to the chest is said to constrict the vessels beneath it, and in any case it often soothes the patient and has a good mental effect. Sodium chloride given by mouth (1 teaspoonful in 3 oz. of water) or intravenously (5 c.cm. of a 10 per cent. solution) increases the coagulability of the blood possibly by drawing into the blood stream tissue fluid and so thrombokinase. The same effect may be produced by binding the limbs, and this has the additional advantage of removing a certain volume of blood from the pulmonary blood stream. Bandages sufficiently tight to stop the venous circulation should be put round the thighs and left for two hours. They should then be undone slowly, and to prevent a sudden increase in the volume of blood in the lungs it is better first to bandage the arms. Calcium has, of course, been advocated and most patients receive some of this in the form of milk

diet. A 5 per cent. solution of calcium chloride may be given intramuscularly or intravenously, but I have not seen any definite benefit from its use. Nor have I seen any good from the injection of pituitrin, which is said to lower the pulmonary but raise the general blood pressure. Horse serum and hæmostatic serum are also of little value in my opinion. In order to clear the bronchial tubes of blood emetics have been used, and it is said that the effort of vomiting has ruptured the bleeding vessel and so by allowing the ends to contract has stopped the hæmorrhage. I do not myself think emetics are often if ever desirable in these cases.

In continued or repeated hæmoptyses *artificial pneumothorax* may stop the bleeding at once. In theory it is certainly the best and most obvious way of dealing with the condition. In practice it is not always possible to know from which lung the blood is coming, and severe or repeated hæmoptyses often occur in chronic cases with so much adherent pleura that no pneumothorax can be induced. Lastly, thoracoplasty may be advised in cases of repeated hæmoptysis if artificial pneumothorax has failed owing to adherent pleura and the other lung is healthy. It is an operation, however, which should not be lightly undertaken.

CONCLUSION.

In conclusion I should like to emphasise four points.

First, everyone has veins at the back of the nose and throat, but bleeding from them is so rare as to be negligible. When a patient spits blood, the thing we can be most certain about is that it does not come from the throat.

Secondly, pulmonary tuberculosis is a very common cause of hæmoptysis, and the patient should be kept under the closest observation. Some patients are sent away for a holiday and on their return it is not uncommon to find signs of tuberculosis so advanced that the patient is incurable or rapidly reaching the incurable stage. Cases of pulmonary tuberculosis starting with hæmorrhage do well, probably because the diagnosis is made early. When we have this symptom, therefore, let us not ignore it and throw away the patient's chances of recovery.

But thirdly, pulmonary tuberculosis is not the only cause of hæmoptysis, and it is important to exclude other causes and not expose a non-tuberculous patient to the restrictions, inconvenience, and expense of a consumptive's life.

Fourthly, most cases of hæmoptysis recover. We can do something to help the patient, and we can do a lot to make him worse. It is not the patient that has the most done for him who of necessity has the best done for him.

Finally, I would refer those who wish to study this subject to a series of articles by Dr. Clive Riviere, which appeared in *Tubercle*, February, March, and April, 1922.