A probationary essay on foreign bodies in the air-passages / [James Duncan].

A

PROBATIONARY ESSAY

ON

FOREIGN BODIES

IN THE

AIR-PASSAGES;

SUBMITTED

BY AUTHORITY OF THE PRESIDENT AND HIS COUNCIL,

TO THE EXAMINATION OF THE

Royal College of Surgeons of Edinburgh,

WHEN CANDIDATE

FOR ADMISSION INTO THEIR BODY,

IN CONFORMITY TO THEIR REGULATIONS RESPECTING THE ADMISSION OF ORDINARY FELLOWS.

BY

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OCTOBER 1835.

EDINBURGH:

PRINTED BY BALFOUR AND JACK.

MDCCCXXXV.

TO

ADOLPHUS MACDOUALL ROSS, M. D.

FELLOW OF THE ROYAL COLLEGE OF SURGEONS

OF EDINBURGH,

THE FOLLOWING ESSAY

IS INSCRIBED,

AS A SMALL BUT SINCERE MARK OF ESTEEM AND REGARD,

BY HIS OBLIGED FRIEND

THE AUTHOR.

TO

ROBERT LISTON, ESQ.

SURGEON TO THE NORTH LONDON HOSPITAL,

THIS ESSAY IS INSCRIBED,

IN TESTIMONY OF

RESPECT FOR HIS PROFESSIONAL CHARACTER,

AND OF

GRATITUDE FOR PERSONAL KINDNESS.

ON

FOREIGN BODIES

IN

THE AIR-PASSAGES.

Few accidents give rise to more distressing symptoms—none are more certainly destructive to life—and none require more immediate decision on the part of the surgeon, than those which form the subject of the following remarks. Unfortunately many cases are on record, in which fatal effects have been allowed to take place, either from uncertainty as to the nature of the accident, or from want of unanimity and decision on the part of the medical attendants. Amongst many which might be given confirmative of this, one is related by Porter as having occurred in his own practice. The case was that of a child who had been thrown down while at play in the street by a jaunting car, the wheel of which was supposed to have passed

over her chest. She survived in a state of considerable suffering until the morning of the third day, when she died suddenly during a paroxysm of convulsive coughing, leaving the friends under the impression that her death had been caused by the injury done to the chest by the accident. The nature of the case was, however, made evident on examination. A piece of almond shell was found in the larynx, with the rough and broken edge entangled in the rima glottidis, and placed in such a manner as effectually to close up the aperture for the transmission of air. The child had the piece of shell in her mouth at the time she was thrown down, and it had passed into the trachea during her confusion, without her being conscious of it.

The cases in which the patients were lost, in consequence of want of unanimity among the surgeons, are also numerous, but perhaps the most striking and instructive are those of Verdier and Louis, inasmuch as in both, the surgeons were allowed to prove the correctness of their opinions by performing the operation after the death of the patients. They are both related in the Memoires de l'Academie de Chirurgie.

In Verdier's case, a bean had passed into the trachea, giving rise to the usual symptoms. He proposed tracheotomy, but was opposed by two

other surgeons, and the child perished within a very short time after the occurrence of the accident. He was allowed to operate half an hour after death, and extracted the bean with ease, proving the correctness of his own opinion, and showing the fatal effects of the opposition of the other surgeons, grounded, as he expresses it, on ignorance of a point so little susceptible of doubt.

Louis' case bears a very striking resemblance in every respect to the above. It occurred in a child seven years old, who had been playing with some kidney beans, one of which accidentally passed into the trachea. The usual symptoms followed, several surgeons were sent for, who each employed different remedies, but without effect, until the third day, when Louis was called in. He immediately saw the nature of the case, and proposed tracheotomy to the parents as the only possible means of saving the child's life, but recommended, in order to shield himself from blame, should the result be unfavourable, and to inspire the friends with confidence, that the advice of some other intelligent surgeons should be taken. To his surprise, however, he was opposed by them, the confidence of the parents was shaken, no operation was performed, and the child died on the third day after the accident. The operation was performed after death, and the bean was

extracted with facility, before a numerous assembly of people, showing how satisfactory the result would in all probability have been, had the operation been allowed during life.

It might be supposed that no doubt could exist as to the nature of the accident; but when we consider that the class of persons in whom it most frequently occurs is in the greater proportion children, who may either be unable to describe, or from the dread of surgical interference may attempt to conceal what has happened, it is not surprising that the case should sometimes be involved in considerable uncertainty.

When the accident has occurred in the adult, its nature is generally made out with facility, but even then, there is at times considerable difficulty, in consequence of the foreign body having entered the trachea without the person being aware of it, during a moment of hurry or fright.

Foreign bodies are admitted into the trachea when they come into the current of air during inspiration, when the glottis is dilated, and every thing favourable for their admission. A person may be holding some solid or fluid in his mouth, an incautious inspiration is made, and the body, if it is situated near the base of the tongue, is drawn in. The symptoms immediately following its en-

trance are most distressing, and are well illustrated by the familiar and daily occurrence, of a drop of wine or water getting, as it is commonly said, "into the wrong passage." Immediately on its entrance, a violent fit of coughing is produced, and a sense of impending suffocation is felt, the inspirations are noisy, prolonged, and imperfect, the expirations forcible, and short, and all the muscles of respiration are thrown into violent spasmodic action. This paroxysm continues until the foreign body is expelled, which it generally is with great force, either through the mouth or nostrils. Immediate relief is then felt, but the noisy respiration, and loss of voice, which also generally attends the accident, remain for a short time, in consequence of the spasmodic action of the muscles of the larynx continuing. In the case we have supposed, all the disagreeable effects are generally over in a few minutes, but even of this simple accident, a few fatal instances are on record.

When a solid body is admitted, the symptoms produced are modified by its nature, by its form and size, by the situation it may occupy, and by its remaining loose, or becoming fixed in the canal. Those which get entrance are for the most part round and smooth, and by far the greater proportion are stones of fruits, beans, peas, &c. Occasion-

ally, however, they are irregular in form, and angular, as pieces of bone, &c.

When a body such as a bean or pea has passed into the windpipe, its entrance is immediately followed by a violent fit of coughing, great difficulty of breathing, and occasionally by a frothy bloody expectoration.

Sometimes the difficulty of breathing is more marked during expiration, than during inspiration; indeed, in some cases the patient can fill the lungs with perfect ease, but is unable to expire, except with difficulty, from the mechanical obstruction presented by the foreign body being thrown up against the larynx. There is, however, much variety in this, for in some it is most conspicuous during inspiration, in others during expiration, and occasionally both are equally laboured. All the muscles accessary to respiration are thrown into violent spasmodic action, the chest is raised, the face becomes purple, the veins of the neck become swelled, and the eyes glistening.

Should the body be small, and of such a form as not to prevent its expulsion, it may be thrown out and no further inconvenience experienced,—but this is a rare occurrence, for the opening of the glottis which will admit a body, will not, in the great majority of cases, allow it to be expelled.

This paroxysm continues for some time, and then is succeeded by a period of calm, and the fit of coughing may not again return, the patient only suffering from the degree of obstruction presented by the body to the passage of the air. A case remarkable for the little annoyance occasioned by the presence of a foreign body, though in the long run it proved fatal, is related in the "Memoires de l'Academie de Chirurgie." The oldest monk of the Abbey of St. Martin's, while walking in the garden, could not resist a particularly plump cherry, the church-bells at the time were ringing, and in his hurry the stone passed into the trachea. A violent paroxysm, threatening immediate suffocation, was produced, but this soon subsided, and was followed by a sleep of several hours duration. For a whole year the patient did not suffer any inconvenience, but at the end of that time he was attacked with cough, attended with fever. These increased daily, and at length a body as large as a nutmeg was expectorated, which was composed of calcareous matter, to which the stone had served as a nucleus. The patient, however, died some time afterwards "en marasme." I have lately heard of another case, somewhat resembling the above, in which a tooth was expectorated, the patient being at the time in an advanced stage of phthisis.

More frequently, the calm is only temporary, and

is succeeded by another paroxysm equal in severity to the first, and these alternations of calm and suffering continue, until the patient is either relieved by the expulsion of the offending matter, or its usual effects are produced.

When the body is angular, or irregular in form, the symptoms are generally more aggravated than when it is round and smooth, and it more frequently produces bloody expectoration; an acute pain is also occasionally felt, enabling the patient to point with accuracy to the spot where the body is lodged. In these cases, however, it sometimes from its form becomes fixed, and gives rise to little uneasiness, the difficulty of breathing being slight, and the paroxysms being rare, but in the long run it proves equally fatal. One violent paroxysm of coughing only, may be induced, and may not return again for a very considerable time, even for a period of several months as we have known in one case, and perhaps not at all. Indeed several cases are on record, in which patients were supposed to have died of phthisis, and the existence of a foreign body in the air-passages had never been suspected. Pelletan mentions one in which a man died after the expulsion of a foreign body from the trachea, of the entrance of which the patient himself was unaware, it having in all probability been admitted during his sleep.

We have stated that there is generally succeeding the paroxysm an interval of calm, at least so far as regards the cough, the difficulty of breathing depending on the size of the body, and the degree of obstruction it offers to the passage of the air. When this relief is complete, which it frequently is, it is too apt to influence the patient and medical attendants in their aversion to any operation for the removal of the body. The cause of the calm is readily explained by the slight irritability of the rest of the canal, compared with the rima glottidis, which is placed, as Porter terms it, as an outwork to defend the important organs of respiration.

The little irritability of the trachea is well illustrated by the ease with which it bears the presence of the canula, which it is customary to introduce after the operation of bronchotomy, when performed for affections of the larynx, and the comparative irritability of the two, is well shown in Mr. Key's case, in which it is stated that great irritation and coughing were produced by passing a long probe *upwards* to search for the body, but much less when it was passed *downwards*. As soon as the foreign body comes in contact with the rima, convulsive efforts are made to throw it off, which may be done, or it may be drawn into the trachea, the lining membrane of which being much less irritable, bears its presence with less inconvenience. The paroxysm of

coughing then passes off, and the difficulty of breathing also becomes much diminished, the greater calibre of the trachea allowing a larger current of air to pass than when the body was impacted in the larynx. If the body should become fixed here, it proves annoying chiefly in so far as it obstructs the passage of the air, or is irritating from its form. If it remain loose, and is so light as to be carried along by the current of air, it gives rise to much more uneasiness, another paroxysm being produced as often as it is thrown up against the larynx. If it should become entangled in one of the ventricles of the larynx, the parts may become accommodated to its presence, and it will give rise to little annoyance, the patient perishing with the usual symptoms produced by the long-continued presence of a foreign body in the air-passages.

Occasionally it passes down, and becomes entangled in one of the bronchi, which is almost invariably the right, a circumstance which is readily explained by the size and direction of the tube. This is, I believe, almost universally the case, and I am only aware of one instance in which it was found in the left. Numerous experiments confirmative of the same fact, were also made by Mr. Key of Guy's Hospital, on the dead body, previously to operating on a case in which it was believed that a sixpence was lodged in one of the bronchi.

When the body becomes fixed here, the symptoms are, some difficulty of breathing, with a sense of constriction across the upper part of the chest, and occasionally, if the body is of such a form as to cause much irritation, a sharp pain is felt over the part where it is situated; there is also a frequent disposition to cough, which is often excited by change of position, and on any slight exertion the respiration becomes hurried.

The body may remain stationary in any one of these positions for a very considerable time, as will be indicated by the symptoms, and then change its situation, as will be indicated by a different train. Thus, in the case related by Sue, in the Mem. de l'Acad. de Chir., a portion of the wing of a chicken remained for seven years in the upper part of the windpipe, and then passed down into one of the bronchi, giving rise to a less annoying, though not less fatal set of symptoms. In this latter position it remained stationary for some years, when it was expelled, but the patient died phthisical.

Foreign bodies in the air-passages may produce death immediately, within a few hours, or days, or not for a considerable time, perhaps not for several years after their admission.

To produce immediate death by suffocation, they must be of such a size and form as, having once become

entangled in the rima glottidis, completely to prevent the transmission of the air, and defy all the convulsive efforts made to expel them.

This may take place either immediately on the entrance of the body, or not for some time afterwards, when, having been first drawn into the trachea, it may, during one of the paroxysms, be thrown up against the larynx, so as effectually to block up the aperture. The case formerly referred to, as related by Porter, was of this nature, and every one in which sudden death does not take place until some time after the entrance of the body, is of the same kind.

When life is prolonged for several days, death is generally the result of the imperfect respiration; rapid congestion, and emphysema of the lungs are produced, the latter sometimes to a very considerable extent, as in the case related by Louis, in which it was found to have passed upwards above both clavicles, forming a very considerable swelling there, the lips become livid, the veins of the neck congested, the pulse weak and intermitting, the brain becomes affected, and the patient dies convulsed. Both these circumstances, the chance of death by immediate suffocation, and the affection of the lungs and brain, which in some cases follow the accident with great rapidity, form very strong arguments in favour

of an early operation, a point of very great importance which will be taken into consideration afterwards.

Death may also take place from inflammation of the larynx, which is extremely apt to follow, if the body should be entangled there, and be at all irritating from its form; but, perhaps, the most general effect produced by the presence of a foreign body, if the patient does not perish by immediate suffocation, is an extensive bronchitic affection, under which he may either sink rapidly, or it may pass into a chronic state, and life be prolonged for a considerable time. In other cases, he may live for some time, subject, however, to repeated attacks of inflammation of the lungs; these may at first be kept down by the usual treatment, but must in the long run prove fatal.

Some few cases are on record, in which the foreign body, after having remained in the air-passages for a very considerable time, has been expelled by the efforts of nature, and a cure effected. These are, however, rare, and are not such as to authorise the surgeon, trusting to a similar occurrence, to delay the necessary practice. A case of spontaneous expulsion and subsequent recovery is given by Mr. Plant in the Dublin Hospital Reports. A piece of wood had passed into the trachea, and at

first had lodged in the right bronchus. At the end of four weeks, during all which time the boy had suffered much from troublesome cough, it was thrown up from the bronchus, into the trachea, where it could be detected moving up and down.

As there appeared to be no particular danger, Mr. Plant trusting that, as it had been thrown up from its first situation, it might also be coughed up from the trachea, deferred operating. At the end of the fifth week, it was so, and the boy recovered.

Another case of this nature is given by Stalpart Vander Wiel. A girl, in swallowing bouillon, got a small bone of veal in her windpipe,—the symptoms were constant cough, with fever, and ultimately haemoptysis, with purulent sputa. At the end of four months, the bone was coughed up along with blood and matter, and the girl recovered, though threatened with consumption.

Dr. Donaldson of Ayr also relates a case in which an ear of grass had passed into the trachea, and became impacted in the right bronchus, giving rise to intense bronchitis, which continued for seven weeks, when the body was expectorated, and the person recovered.

Another case is related by Dr. Lettsom, in which the covering of a button remained in the air-passages for eight months, when it was coughed up,

and the pulmonary symptoms subsided. But, perhaps, the most remarkable case of spontaneous expulsion and subsequent recovery, is that related by Mr. Howship, in which a nail had passed into the trachea, in a man aged sixty-five. The accident happened on the 15th of August,—severe pulmonary symptoms followed, and the man was given up by the faculty, but the nail was thrown up on the 12th of November. The man recovered, and was alive twelve years afterwards, but subject to frequent pulmonary affections.

Such cases are, however, as we have said, rare, and do not authorise delay on the part of the surgeon, for every minute is pregnant with danger, and such irreparable injury may have been done to the lungs, that little or no benefit will result from an operation, when it is at last deemed necessary; indeed, in many of the cases operated on, the patients have remained subject to pulmonary affections for life, in consequence of the operation having been too long deferred, and almost every unsuccessful case may with propriety be attributed to the same cause.

Numerous cases are to be met with, shewing the danger of trusting to the spontaneous expulsion of the body, and showing that if it has been retained for any considerable length of time, the patient, if

he is not cut off by any of the above modes, almost invariably dies phthisical, whether it has been expelled or not. Dupuytren relates the history of a friend of his own, into whose trachea a piece of money had accidentally passed. The nature of the case was evident, but the patient refused to submit to surgical interference, hoping that the body would be expelled by the efforts of nature. For five years he suffered occasionally considerable inconvenience from it. It then became fixed in one of the bronchial tubes, and gave rise only to slight difficulty of breathing. Symptoms of phthisis, however, supervened, and on his death, which took place about ten years after the occurrence of the accident, the coin was found in the centre of a tuberculous cavity. In the case formerly referred to, as related by Sue, the patient died phthisical at the end of seventeen years, the body having been expelled some time before.

Prompt and accurate diagnosis is of the very first importance in cases of this nature; that it is so, cannot be doubted, when we consider the sudden fatal effects that are frequently produced, and, even though these should not occur, how rapidly irreparable injury may be done to organs so important to life as the lungs. To form a correct diagnosis, every means which can at all assist us must be em-

ployed. We must make ourselves acquainted with the previous state of the patient's health, and ascertain whether he has been placed in circumstances likely to be followed by affections of the lungs or larynx which could possibly be confounded with the accident. We must also inquire carefully into the history of the case, as to its date, the mode in which it happened, and the symptoms immediately following the occurrence, and the probable size and form of the body supposed to have entered the air passages. The existing symptoms must also be examined, not only with the view of ascertaining the actual presence of the body, but also so as to learn if possible its situation. In doing this, the greatest care must be taken, and every thing at all calculated to throw light on the nature of the case must be called to our assistance; for as there is no case, the successful treatment of which is more calculated to reflect credit on the surgeon, so there is none in which an operation unnecessarily performed would prove more ruinous to his professional reputation, and none perhaps in which he would or ought to feel more acutely, did he omit to perform an operation, which is in itself attended with so little risk.

A knowledge of the previous state of the patient's health, and of the commencement and progress of

the symptoms, is of very great consequence, and will always be useful in enabling us to form our opinion as to the presence or absence of the body. Most of the diseases of the lungs have, in different cases, been confounded with this accident, an error which would in all probability have been avoided, had the previous history and the existing symptoms been sufficiently attended to; indeed, the cases must be rare, in which any doubt can exist, after proper inquiries have been made.

The acute affections of the larynx, such as croup and laryngitis, in consequence of their symptoms more closely resembling those produced by this accident, may give rise to more difficulty, but these also, if sufficient care is taken, may be easily distinguished from it. They are generally ushered in by rigors, followed by some degree of fever, cough, and difficult respiration, which gradually increase, while in the present instance, the symptoms set in with a violent paroxysm of coughing and difficulty of breathing, generally while the patient is in a state of perfect health. In the one, there is always a high degree of fever; in the other, there is at first, and perhaps for a considerable time, none at all. In croup, the cough differs remarkably from that produced by this accident. In the one, it is an incessant, dry, harsh cough, while, in the other, it comes on in vio-

lent paroxysms, which are succeeded by periods of calm. In the one, the difficulty of breathing is felt principally during inspiration, while, in the other, it is said by some to be felt principally during expiration; but from what has been said formerly, it will be seen, that little reliance can be placed on this symptom, as a means of distinguishing between the two. In addition to the means of diagnosis already mentioned, we possess another, and perhaps the most valuable of all, in auscultation. The cases on record are amply sufficient to prove how useful a means this is. Pelletan mentions, " une rale signe caracteristique de la maladie." In the Leçons Orales of Dupuytren, there is also given as one of the characteristics of the presence of foreign bodies in the trachea, " La sensation de leur choc contre les parais du canal, sensation qui peut etre perçue par la main, et par l'oreille." He remarks, that it is not equally distinct in all cases, nor in the same case, at all times. He says, that the body may be adherent, and then, not being displaced by the air, it does not strike against the walls of the canal, or being enveloped in copious or thick mucus, the stroke is less distinct than when little mucus exists. Mr. M'Namara, in the Dublin Hospital Reports, speaks of a " ronflement" as being indicative of a foreign body moving up and down in the trachea, and of a

peculiar valve-like sound being heard when it strikes against the rima glottidis. The above sounds are only heard when the body remains loose in the tube, so as to be carried along by the current of air. When it becomes fixed there, a sonorous rale only will be given. If it become impacted in one of the bronchial tubes, the signs given will be modified by its size and form. It may be such, as only to diminish the volume of air admitted to the lungs, or it may obstruct it altogether. In the one case, we have only diminution in the loudness of the respiratory murmur,—while, in the other, it will be lost altogether, the sound on percussion on both sides of the chest being at the same time clear. This absence of the respiratory murmur, is not permanent, as it frequently returns after a forcible expiration, or fit of coughing, and is again lost, when the body returns into the bronchus. If the body is there, and presents a sharp edge to the current of air, a sibilous or whistling sound is produced. The utility of this means of diagnosis, is well illustrated in the two cases related by M'Namara in the Dublin Hospital Reports, and as the signs were extremely well marked in both these, we will give them in his own words. In the first, a plum-stone had accidentally passed into the trachea. The patient was a boy four years old. The following were the signs afforded,—

"On the left side respiration was more puerile than natural, mixed with some sonorous rale superiorly. On the right, there was a nullity of respiration, whilst the thorax on both sides sounded perfectly clear on percussion. I kept the stethoscope applied to the right side of the thorax for about two minutes, when the boy made a sudden and violent effort at expiration, upon which the respiratory murmur which was before inaudible returned, with an intensity equal to that on the left; and when he became tranquil, we could distinctly hear the valve-like sound, similar to that before described as occurring when the stone was pressed against the rima glottidis." The latter sound he described as resembling that produced by striking the tongue forcibly against the anterior part of the hard palate, when the mouth is closed. In this case, though the symptoms were extremely well marked, the operation was delayed in consequence of some of the medical attendants not being satisfied as to the nature of the case. It was, however, ultimately performed, and with the happiest results. In the other case, related by him, a plum-stone which the boy had been whistling through, having made a hole in either side of it, and removed the kernel, so as to make it resemble a bird-call, had entered the trachea. The boy was able to make a whistling noise audible at a considerable distance,

whenever desired to do so ; this he effected, by forcibly expelling the air through the stone, but he never could produce it during inspiration. In this case the operation was also performed with success. Mr. M'Namara had concluded from the symptoms present, that the body was lodged in the upper part of the trachea, and performed laryngotomy. The stone not escaping in the usual manner, a flexible catheter was passed upwards so as to dislodge it, and press it into the pharynx. This was apparently effected, the boy being no longer able to whistle through it, and the symptoms disappearing. Nothing remarkable occurred in the case for eight days, when, on examining the chest, he was astonished to find the respiratory murmur absent in the right lung, and more audible than natural in the left lung, both sides at the same time sounding clear on percussion. He concluded that the stone was lodged in the right bronchus, and in a few minutes afterwards, the ronflement, formerly described as indicative of a foreign body moving in the trachea, was heard, and the boy was able to whistle through it but faintly,—the whistling noise and the absence of respiration alternating. The opening was dilated downwards, by means of a probe-pointed bistoury, and the stone was thrown out in a fit of coughing. The boy was dismissed

perfectly cured in six days after the removal of the body.

Two cases were related by Dr. Bullar to the Royal Medical Society of Edinburgh, two sessions back, equally instructive with the above, and, perhaps, more confirmative than either of the utility of auscultation, inasmuch, as in both the patients were believed by the medical attendants to be labouring under apoplexy, until on the application of the stethoscope by another surgeon, the symptoms were found to be dependent on the presence of foreign bodies in the trachea. In both cases tracheotomy was performed, and the lives of the patients saved. In Mr. Key's case, formerly alluded to, it is stated, in the report given in the Lancet for 1828–9, that the opinion of the surgeon was strengthened by percussion and the use of the stethoscope. The signs afforded by these means are not given in that report, but it is stated that while breathing with great difficulty, the left side of the chest only seemed to expand, the right being motionless. In Mr. Liston's case which will be afterwards noticed, the signs afforded by these means were less satisfactory than those given above, in consequence of the form of the body, and the manner in which it was impacted in the bronchus.

The treatment which ought to be pursued in ac-

cidents of this nature, is now generally agreed upon. With regard to those remedies formerly in use, which were exhibited with the view of promoting the expulsion of the body, it will only be necessary to say a few words, and these in condemnation. The principal of these were sternutatories, emetics, and demulcents. From the first of these, which were formerly, perhaps, the favourite remedy, little good can be expected, and much danger may be dreaded. If we consider the state of the glottis, when the body is admitted, that it is then in its state of dilatation, and that sneezing is simply a forcible expiration, during which it is contracted, we must see that it is only under a concomitance of the most favourable circumstances that it can be expelled. But even granting the probability that it might, still the exhibition of these remedies, would in almost every case be quite uncalled for; the violent paroxysms of coughing so generally attendant on the accident, answering all the purposes for which they are employed. But their use is not only attended with no benefit, but may be productive of fatal consequences. If death take place suddenly some time after the body has been admitted into the trachea, it is produced by its being thrown up into the larynx, and becoming impacted there, so as to obstruct the passage of the air. We have this to

fear from these remedies; and several cases are recorded in which patients, while under their influence, have been placed in most imminent danger. It is true, that one or two cases are to be met with, in which their exhibition was followed by the expulsion of the body, but these are rare instances, and we think that the hazard in which the patient may be placed by their use, more than counterbalances the remote chances of benefit which alone can be expected from them. Emetics are less to be dreaded than sternutatories, but there is also less to be hoped from them. Demulcents are useless.

Desault has advocated the introduction of an elastic tube into the trachea; but the practice is one from which no permanent advantage can be expected, and has, I believe, been approved of by none but that surgeon himself.

It is well to introduce a probang down the œsophagus, previously to operating, if any doubt should exist as to whether the body is lodged in this tube, or in the trachea, a doubt which can hardly exist, if the case has been examined with sufficient care; though, from the cases on record, we are led to believe that the mistake is by no means an uncommon one. But one trial is sufficient to remove all doubt, and the repeated introduction of the probang is much to be reprobated, both as being pro-

ductive of much annoyance to the patient, and as wasting much valuable time.

The only admissible treatment consists in making an opening, either into the larynx, or trachea, so as to allow the expulsion or extraction of the body. This operation is of very old date in the diseases of the fauces and windpipe impeding respiration, but its application for the removal of foreign bodies is more modern. Amongst the earliest cases in which it was performed for this purpose, are those of Heister, Raw, and one related by Verduc.

Several authors who have related cases of death from this accident, although they advocated strongly the operation of bronchotomy in different diseases, seem never to have dreamed of its application here. The papers of Louis in the Mem. de l'Academ. de Chirurg. were the first which drew the attention of surgeons forcibly to this subject, and since then so many successful cases have been published by other surgeons, both in this country and on the Continent, that it is now generally looked upon as the only proper treatment.

Different operations have been recommended by different surgeons, some advocating laryngotomy in all cases, others laryngo-tracheotomy, and others tracheotomy. None of these ought to be uniformly followed to the exclusion of the rest; but each should

be employed as it is best suited to the circumstances of the case. When the body is entangled in the larynx, one of the first two is the best fitted, as by them the body will be most easily reached and extracted. When it is lodged in the trachea, or bronchus, tracheotomy ought to be performed, it being most favourable for the spontaneous expulsion of the body, or its removal by instruments.

Both these operations are simple, and may be performed by any competent surgeon. In laryngotomy, the tube may be reached by one incision, but tracheotomy requires more care, particularly in children, in whom the neck is deep and short; and, besides, several important structures lie in the neighbourhood of the incisions, and several anomalous arterial distributions are met with, which inculcate the necessity of proceeding in the operation with due caution.

In this operation, as in the preceding, the patient is to be seated on a chair, with his head thrown back, so as to make the trachea more prominent and elongated. This position, Dupuytren remarks, is most favourable for the division of the soft parts and trachea, but less so for the expulsion of the body, from its stretching the parts and preventing the dilatation of the opening, which takes place during flexion of the neck.

An incision is to be made, commencing immediately below the cricoid cartilage, and continued downwards for about an inch or an inch and a half, according to the age of the patient. The cellular tissue is then divided by a few touches of the bistoury, the sterno-hyoid and thyroid muscles of the opposite sides are separated by the forefinger, and the trachea exposed. The thyroid veins, if they come in the way, and any abnormal arterial branches are to be drawn aside, and the isthmus of the thyroid gland, if it should present, is to be pushed slightly upwards. The patient is then desired to swallow his saliva, so as to elongate the trachea, the bistoury is to be pushed into the tube with its back towards the sternum, and the rings to be divided to the necessary extent,—it being kept in mind, that the incision of the trachea must be more free than when the operation is performed, simply to allow the admission of air to the lungs.

The most common source of annoyance is bleeding from the thyroid veins, but this may in general be avoided, if sufficient care is taken in the performance of the operation; and if they should be divided, and the hemorrhage be considerable, the opening of the windpipe should be delayed if possible until it has been suppressed. This is generally a safe precaution, although in one or two

cases it has been found, that a hemorrhage, at first considerable, has subsided immediately on the trachea being opened, and the respiration becoming free. In some cases, a vessel, (arteria media thyroidea) arises from the arch of the aorta or innominata, and passes upwards along the front of the trachea. Scarpa has met with one case, and Allan Burns with five, in which both carotids arose from the innominata, and the left crossed the trachea high up in the neck, in such a direction as would inevitably have caused them to be wounded in tracheotomy. Mr. Porter also mentions one in which he believed some irregularity of this kind existed. Such arterial distributions are not frequently met with, but the possibility of their occurrence is sufficient to inculcate the necessity of proceeding in the operation with care. A wound of either of the lobes of the thyroid gland, which is apt to happen if the trachea is not properly fixed during the operation, would be attended with troublesome bleeding, but division of the isthmus is of little consequence.

In children, from the reasons given above, the operation is generally much more difficult than in the adult. Porter mentions a case which came under his own observation, in which a surgeon was actually obliged to give it up because he could not

find the trachea; and Pelletan, in his remarks on one, in which he met with considerable difficulty, says, that the operation should never be performed except by a person of intelligence, coolness, and skill in operating.

If the foreign body is entangled in the larynx, it is in general brought into view by the operation, and extracted with ease, by a small pair of forceps, or any other convenient instrument. If this cannot be effected, it may be dislodged from its situation by means of a gum elastic catheter, and pushed into the pharynx. If it remain loose in the trachea, the object of the operation is in general attained as soon as the incision is completed, the body either appearing at the wound so as to be removed with facility; or what is more frequently the case, being expelled with considerable force as soon as the bistoury is withdrawn.

Experiments illustrative of this were performed by Favier on dogs. Foreign bodies of different forms were introduced into the trachea, and sometimes pushed down into the bronchus, and after having been allowed to remain there for some time, tracheotomy was performed.

In every case they were immediately expelled by the wound, a result which was not affected by any change in the position of the animal. Most authors

who have advocated the operation were aware of this fact, and Boyer trusted so much to it, that in one case, in which he operated, in which the body was not expelled immediately in the usual manner, he did not make any attempts to extract it by instruments, but sent the patient to bed, and in three hours afterwards it was expelled during a fit of sneezing, brought on by giving the child snuff. In a case operated upon by Mr. Crampton of Dublin, the body, which was a herring bone, could not be found at the time, but appeared at the wound some days afterwards, and was removed by the mother;—and in one given by Dupuytren, the bean was found on the dressings the third day after the operation.

When the body does not escape immediately, or within a short time after the operation, it should be sought for, and extracted by means of probes or forceps, and its removal by these means may generally be effected, even though it should be lodged in one of the bronchi.

I am not aware, however, of any case in which it has been removed from this situation, except the one operated on by Mr. Liston in 1834, of which an account is given in the Lancet of that period.

A similar attempt had, it is true, been made by Mr. Key some years before, but the patient died,

either during or immediately after the performance of the operation.

In Mr. Liston's case, a piece of bone had become impacted in the right bronchus, and had remained there for seven months, giving rise to distressing symptoms when the woman was put under his care.

No doubt was entertained by Mr. Liston, either as to the presence or position of the body, and accordingly tracheotomy was performed. As soon as the agitation following the operation had subsided, and sufficient time had been allowed for its spontaneous expulsion, a gun-shot probe was passed down to the right bronchus, and its presence ascertained. It was then extracted with ease, by means of a pair of forceps made for the purpose. As the piece of bone was described by the woman as being thin, and about the size of a sixpence, Mr. Liston had ordered two pairs of forceps to be made, so as to seize it whether it happened to lie in the bronchus with its edges pointing antero-posteriorly or laterally, a very necessary precaution, without which, the operation would in all probability have failed, or at least been much delayed. The result was most gratifying, and the patient left the hospital on the fourteenth day, quite free from complaint.

Should it happen that the body, immediately on its admission, becomes entangled in the larynx, and

produces apparent death, the operation must be had recourse to immediately, and artificial respiration employed. I am not aware of any case of a foreign body in the air-passages, in which the practice has been attended with success; but it has been so, under analogous circumstances, produced by the lodging of a large piece of meat in the œsophagus; and in the former case also, the result would in all probability be most gratifying, did the surgeon happen to be on the spot at the time of the accident, and act with promptitude.

By some surgeons, the wound is closed immediately. Dupuytren, on the contrary, recommends this not to be done, until several days after the operation, in order to prevent the return of emphysema. This, however, appears to be an unnecessary precaution, it being extremely unlikely that emphysema should occur when there is no obstruction to the transmission of the air by the natural passage.

The better plan is, to bring the edges of the wound together, as soon as the oozing of blood has ceased, but not earlier, as by its passing into the trachea it might give rise to much annoyance. No trouble is ever given by the wound, the elasticity of the rings of the trachea being sufficient to bring their cut edges together, and very slight re-

tentive means are sufficient to close the external opening, so that complete union generally takes place within a few days.

The success of the operation is not always secured on the removal of the body, a circumstance which in the majority of cases, is attributable to its performance having been too long delayed. Many instances confirmative of this, might be given ; even though the time during which the body has been retained be compăratively short, if the symptoms have been aggravated, the chance of a happy termination is much diminished. Thus, in a case related by Pelletan, in which he had operated on a child for the removal of a bean from the trachea, it proved unsuccessful.

The child had laboured for four days under paroxysms threatening suffocation, and had been affected with convulsions for thirty-six hours, when it was brought to him. Tracheotomy was performed, and the bean immediately expelled. Temporary relief was afforded, and the child recovered so far as to be restored to sensibility, but the convulsions returned, and the child perished. Another case of a similar nature also occurred in the practice of this surgeon.

The patient was a child two years old,—it had been amusing itself by throwing up stones in the

air, and catching them in its mouth,—one of them entered the windpipe and produced a violent and continued cough; a medical man was called, but although the child described accurately what had happened, he never dreamed of the presence of the body in the air-passages, but decided that the patient laboured under some affection of the lungs. Every kind of antiphlogistic treatment was had recourse to, but without effect, and without opening the eyes of the attendant to the nature of the case. It was then brought to Pelletan in a state more approaching death than life,—he immediately saw the nature of the accident, and operated, and the body was shortly expelled. The success, however, as in the former case, was only temporary, irreparable injury had already been done to the lungs, the cough continued, the expectoration became purulent, the wound was long in cicatrising, and the child died eight months after the occurrence of the accident.

The termination of these and similar cases, though it may diminish our hopes of success under such circumstances, ought not to deter us from operating, in any instance, however aggravated the symptoms may be, and however long they may have continued, for we have on the other hand, cases equal in severity to the above, in which the

happiest results followed. They teach, however, how important it is that the operation should be performed as soon as the nature of the accident is understood, and what has formerly been stated shows the impropriety of temporizing, in expectation of the expulsion of the body by the efforts of nature.

A degree of doubt as to the presence of the body, and the dread of operating and of no body being found, or of not being able to extract it, has perhaps very great weight in making medical men averse to having recourse to surgical interference. But the history and symptoms of the case, are generally so clear, and the ease with which the bodies have in almost every instance been removed, is such, that it is seldom that there can be room for doubt or fear.

The doubts as to the presence of the body, would appear in most cases to be strengthened by the periods of calm, so generally alternating with the paroxysms of suffering produced by the accident. But the knowledge of the almost invariable occurrence of these, and their explanation being now so well understood, any delay founded on them, betokens an inexcusable degree of ignorance on the part of the surgeon.

In general, even after the most successful opera-

tions, some subsequent treatment is necessary to subdue the affection of the lungs, which, in most cases, has been excited, however short a time the body has remained in the air-passages. If the operation has been performed early, little will be required, but if it has been delayed long, the treatment must necessarily be more active.

In some cases the voice remains hoarse for a few weeks after the operation, but this gradually passes off; if, however, the incisions have encroached much on the larynx, it may continue so for life.