

Image Challenge: Find the White Spot!



Can You Identify A White Spot (Lung Cancer) on the Chest X-Ray Above?

The answer will be revealed at the end of this article.

Save Your Breath

Diagnosing and Treating Lung Cancer with a Blocked Windpipe

The majority of deaths in cancer patients happen in those who have lung cancer. Lung cancer is the most common cause of cancer-related deaths in the world. In Singapore, it is the most common cause of death in males, and second most common in females. However, the number of deaths in females only lags behind the number of deaths in males by about 100 deaths a year. The reason for this extremely high death rate in lung cancer is because discovery is usually only made during the late or advanced stages. Most patients (85%) get diagnosed in stage III or IV when it is not curable anymore. v

The journey for any person with lung cancer usually begins from an abnormal chest x-ray that was done to either evaluate certain chest symptoms like cough or shortness of breath, or as a part of routine health screening, long-term visit pass application or pre-employment health check. Sometimes, the journey begins from a CT scan of the abdomen or heart which was done to evaluate some other symptoms unrelated to the lungs, but ended up detecting lung cancer.

As a point of interest, smoking is not the only cause of lung cancer. Contrary to this popular belief about smoking, in Asian countries, up to half of lung cancer patients are actually non-smokers, with genetic pre-disposition being the postulated reason for their disease.

DIAGNOSIS

Lung cancer most commonly appears as a small white spot somewhere in the lungs, or as a large mass or enlarged lymph nodes in the centre of the chest on a chest x-ray or CT scan. Most lung cancer patients do not have any symptoms or only suffer minor symptoms.



Figure 1: Lung nodule



Figure 2 and 3: Lung mass



Lung cancer kills the most people among all cancers. It kills more people than breast, colon, pancreas and prostate cancer combined. The main reason for this grim picture is because it remains silent with few or no symptoms in the early stages

For diagnosis, a CT scan of the chest is usually followed by a biopsy of the abnormal area in the lung, a PET scan and a MRI brain scan to look for spread to other parts of the body outside the chest. Once these are done, there will be a selection of therapy from the choices of chemotherapy, targeted therapy, immunotherapy and radiotherapy. This is the standard procedure for diagnosing and managing lung cancer.

TREATMENT

Chemotherapy entails using certain drugs to kill fast-growing cancer cells in the body. Since cancer cells grow and multiply much more quickly than most cells in the body, these cells get targeted by the chemotherapy drugs. However, many types of healthy cells (hair, intestines, blood cells, etc.) also grow quickly and these cells can also get killed by the chemotherapy drugs, giving rise to the well-known side effects of hair loss, etc. Some examples of chemotherapy drugs include cis-platin, carboplatin, paclitaxel and etoposide.

In terms of targeted therapy, while chemotherapy works by killing cells that divide rapidly (including some healthy cells), targeted therapies work by targeting something specific to a cancer cell. This allows the medication to stop cancer cells from multiplying, but preserve the health of most normal cells. Targeted therapy is an attractive therapy in two ways. First, it can be taken daily in a pill form. Thus, it is just like

taking regular diabetes or high blood pressure medication daily. Secondly, it has less toxic side effects compared to chemotherapy. Examples of drugs used for targeted therapy include Iressa (Gefitinib), Tarceva (Erlotinib) and Tagrisso (Osimertinib).

Immunotherapy involves using a person's own immune system to fight cancer. This is done by stimulating or boosting the natural defences of our immune system so that it works harder or smarter to find and attack cancer cells. Examples of drugs used for this kind of treatment are Pembrolizumab (Keytruda), Nivolumab (Opdivo) and Atezolizumab (Tecentriq).

Finally, radiotherapy requires the use of high doses of radiation to kill cancer cells and shrink cancer. Almost all of us have received some form of radiation, such as when we undergo a chest x-ray, or take an x-ray for a bone fracture or for our teeth. However, the dose used to perform x-rays is very small. When the same x-rays are used at very high doses and aimed at the cancerous area(s) in the lungs, they carry the potential to kill cancer cells.

BLOCKED WIND PIPE

In 30% of lung cancer patients, the disease presents with a blocked wind pipe. When lung cancer presents in this manner, it is usually not incidental because the blocked windpipe makes breathing difficult. The patient is forced to seek help for his hard and laboured breathing.

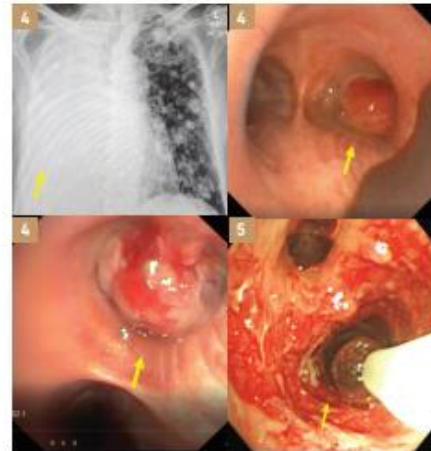


Figure 4: Right lung collapse from lung cancer blocking the right-sided wind pipe
Figure 5: Balloon dilatation

While the treatment of advanced lung cancer with or without the blockage of windpipe is systemic in the form of either chemotherapy, targeted therapy, immunotherapy or radiotherapy, the treatment of advanced lung cancer with a blocked wind pipe requires an additional step—the unblocking of the wind pipe.

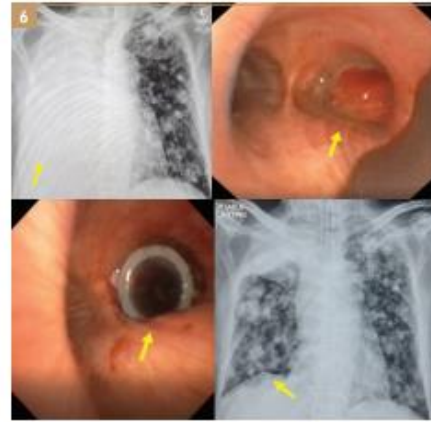


Figure 6: Stent placement in the right sided wind pipe resulting in re-expansion of the collapsed lung

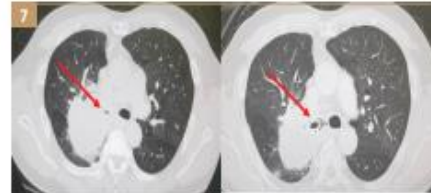


Figure 7: Narrowed right sided wind pipe before treatment (left); Loose stent in right sided wind pipe after chemotherapy (right)



Figure 8: Stent visible in the right wind pipe before removal (left); Right sided wind pipe after stent removal (right)

The majority of patients who have advanced cancer with a blocked wind pipe are at greater risk of dying from suffocation than from the disease itself. Many of them are not even fit to start their cancer therapy because of their shortness of breath or risk of suffocation. Hence, they need to have their wind pipe unblocked first. This can be achieved by several methods.

One such method is by placing a balloon in the blocked wind pipe and inflating the balloon such that the pressure from the inflated balloon opens up the blocked wind pipe. Another method is to burn the tumour away in the wind pipe using laser or other thermal energy techniques like argon plasma.

Yet another method involves the placing of a stent in the blocked wind pipe to keep it open via the mechanical effect of the stent. Many times, a combination of these different techniques is required to achieve a reopened wind pipe.

For patients who require opening up of the wind pipe by placement of a stent before starting their targeted cancer treatment, the stent can be removed after the cancer has shrunk in size and the stent has become loose. The timing of stent removal is sometimes based on a repeat CT scan showing the stent to be loose or based on the development of a new cough or wheezing from the movement of the loose stent.



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SUMMARY

In summary, lung cancer kills the most people among all cancers. It kills more people than breast, colon, pancreas and prostate cancer combined. The main reason for this grim picture is because it remains silent with few or no symptoms in the early stages. This leads to failure of detection during the curable stage. However, it should be noted that exponential progress has been made in the treatment and survival of lung cancer in the last decade. This progress continues unabated.

A subset of lung cancer patients may develop blockage of wind pipe from lung cancer. These patients pose a challenge to diagnosis and treatment as they can get breathless and become unstable. They require opening of their wind pipe first before cancer treatment can be started. This is best achieved by endoscopic techniques of balloon dilatation, laser therapy and stent placement. The stents can be removed after the cancer has shrunk due to treatment.

It is envisioned that lung cancer may be reduced to being a chronic disease in the future, similar to what have happened to tuberculosis (TB) and human immunodeficiency virus (HIV) infections. Very few people die from TB or HIV nowadays compared to 10-15 years ago. (1)(2)(3)

X-Ray

CT Scan

ANSWER:
If you cannot spot the white area, that is because it is barely visible. The chest X-Ray (on the left) and CT scan (on the right) of the same person indicate the weakness of x-ray as the white spot is not visible on the chest x-ray, whereas it becomes visible on the CT scan. Hence, a CT scan is the best of choice for picking up lung cancer!