

ASCULTATION



JABES

Written by GS Technology. Co.

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Contents

1. History of the stethoscope
2. Principle and structure of the stethoscope
3. How to use the stethoscope
4. Auscultation Technique
5. The electronic stethoscope

1. History of the stethoscope

Doctors use stethoscopes on their ears behalf. The stethoscope is an acoustic medical instrument for listening to internal sounds within human bodies to diagnose.

The word of 'stethoscope' is derived from Greek *stethos*(breast) and *skopein*(look at).

The stethoscope was invented in 1816 by the French physician, Rene Laennec(1781~1826) who had been seeing a young woman with heart disease. Remembering the fact that sounds are transmitted through hard material, he rolled some sheets of papers into a tube and placed one end upon the woman's chest. He was able to hear the sounds of heart and breath sounds via the other end of that. His wooden tube was the first stethoscope. Modern stethoscopes with binaural ear tubes hadn't been developed until he died. Later, the stethoscopes became the symbol of doctors' ears.

In those days the stethoscope was a very simple device, but helpful to examine chest troubles like tuberculosis accurately.

With the need for hearing more accurate sounds, the material of stethoscopes have been changed from wood, horns and metals to even digitalized ones.

Before the stethoscope was invented, doctors were consulted depending on the conversations with their patients. With various medical instruments, doctors gradually have lost the ability to diagnose based on their experiences and insights or to decide clinically. In other words, doctors have degenerated into

technicians using medical equipments. The stethoscope was to medical science what typography was to western culture.

Some doctors say that a lot of high-tech medical equipments would expel stethoscopes. However as the X-ray have developed into the high-tech DDR(Digital Direct radiology) in spite of the advent of CT, so the ordinary stethoscope would develop into the electronic one with the computer systems.

“Computer Recognizes Abnormal Heart Sounds in children(25th June, 2001)” by American Heart Association says that common cardiac disorders of children are detected on the evidence of the data recorded into computers connected with electronic stethoscopes.

The JABES Life Sound System Electronic Stethoscope is exactly the system.

2. Principle and structure of the stethoscope

The stethoscope is used primarily to listen to the sounds of lungs, heart, and intestinal tract.

A stethoscope generally has a chest piece, tubes, ear tips, binaural pieces. The chest piece usually consists of two sides that can be placed upon the patient's skin; a bell, bowl-shaped, and a diaphragm, which is a flat disc.

A. Bell

The bell transmits low frequency sounds within the range of 20Hz~200Hz, which is generated by opening and closing of heart valves or a backflow of the blood. The bell covered with a diaphragm is used for children in some particular cases, but the bell is not only for infants.

Doctors used to ask their patients to stop breathing to listen carefully when they were panting. Because the heart sounds using a bell are low, doctors prefer listening with a diaphragm to a bell.

B. Diaphragm

The diaphragm transmits higher frequency sounds within the range of 200 Hz~1 KHz, originated by lungs or the movement of intestines.

However, the tubulous stethoscope has a fundamental problem that its diaphragm transmits breath sounds with loud heart sounds together.

C. Tube

After vibrating the diaphragm, body sounds should reach to the doctor's ears exactly, but high frequency sounds of lungs are often lost by high pass filtering of a tube in deed. Therefore doctors can't listen to breath sounds. Added to that, heart sounds are heard with breath sounds. With that reason, some cardiologists often shorten the tube of a stethoscope or 27inch-stethoscopes have come into the market these days for clear sounds.

A Norwegian journal reported on the importance of filters and sounds of the stethoscope: a physician detected the initial stage of bronchial cancer with an electronic stethoscope not an acoustic one.

The electronic stethoscope can provide noise reduction and signal enhancement. Therefore doctors don't need to give patients pain by a violent pressing with a stethoscope to listen.

D. Binaural pieces

The stethoscope has binaural sticks of tempered aluminum or steel hanging around the ears. The binaural pieces of a high-grade stethoscope are made of tempered aluminum, which transmits sounds clearer than steel. The plastic binaural pieces are also produced to go down in price. However, plastic ones are not usual due to be reluctant to insert them into ears.

E. Ear tips

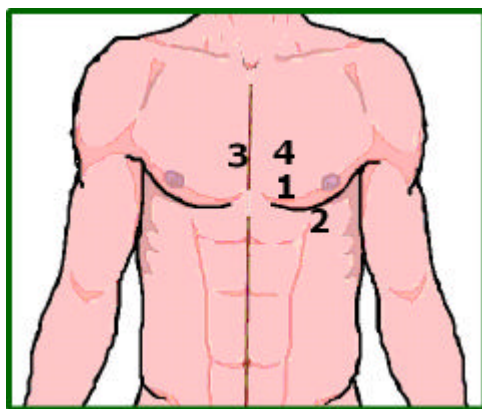
The stethoscope also has the ear tips to deliver the sounds in ears, so ear tips are designed to conform to ears and comfort them in order to use for a long time, and made of harmless material in human bodies. Avoid the ear tips of plastic or latex.

3. How to use the stethoscope

A. How to handle a stethoscope

Hold the chest piece comfortably and place it directly on the skin. Listeners should hear a steady lub-dub sound without putting pressure on the bell or moving their fingers and a stethoscope to distinguish the sounds of breath and heart.

B. Auscultation of heart sounds



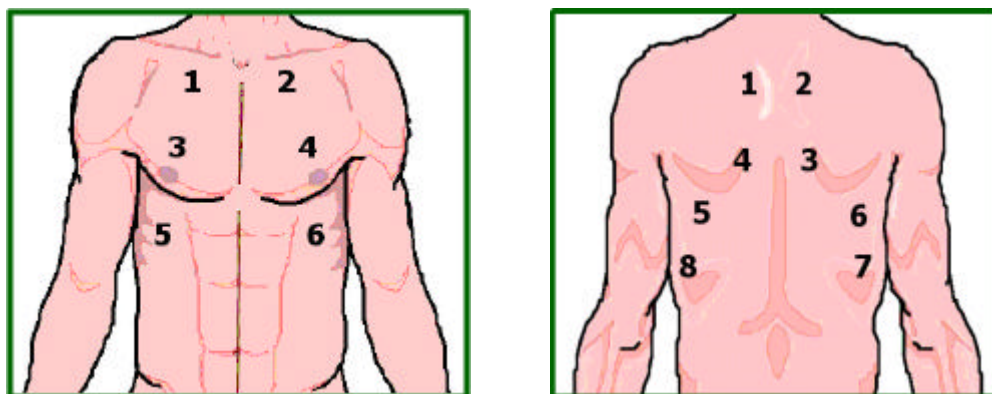
Using the acoustic stethoscope, the chest piece must be placed on bare skin

and you can listen to the sounds when patients stop exhaling for a while.

When diagnosing with the JABES electronic stethoscope, the lub-dub sound is heard through thin clothes adjusting the B mode (bell mode).

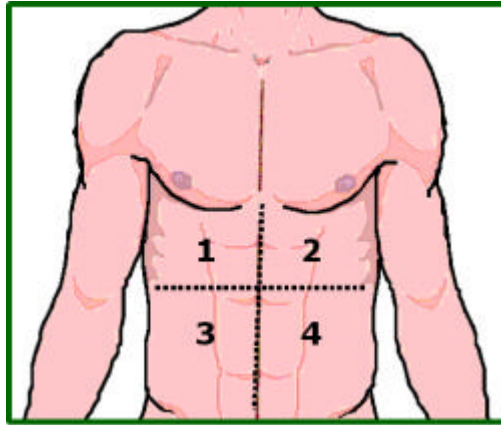
C. Auscultation of breath sounds

Adjusting the D mode (diaphragm) of the JABES electronic stethoscope, ask the patients to take slow and deep breaths through their noses and keep steady speed of breathing while performing. You should listen to the sounds of bilateral sides and observe upper and lower lungs evenly.



D. Auscultation of abdominal sounds

Adjusting the W mode or B mode of the JABES electronic stethoscope, place the chest piece upon bare abdomen of a patient drawing up the knees and put pressure lightly to be contact closely to the skin. Be careful not to moving fingers or a stethoscope for maximum abdominal sounds.



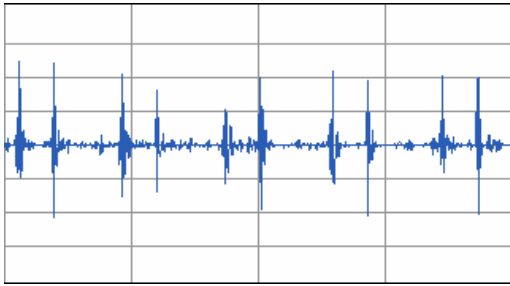
4. Auscultation Technique

How can you distinguish the body sounds?

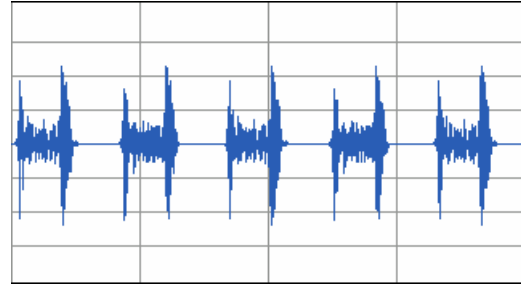
Auscultation to listen to a heart murmur with a stethoscope is a basic method among various examinations to detect heart disease. When a heart murmur is heard, close examinations like radiography, an electrocardiography or an echocardiography are required.

It's difficult to distinguish the heart murmur with a usual stethoscope in truth, so doctors do no more than to wonder about a strange sound with it.

However, it's very easy to detect heart disease with the JABES stethoscope, and moreover accuracy is 60% when you use it with a computer system according to an article of a domestic journal.



[normal]



[abnormal -HSM] / Interventricular septal defect

A. Heart sounds

In a normal heart, the sounds of 'lub-dud, lub-dud' occur in sequence with each heartbeat. The first heart sound is often called 'S1' and the second sound, 'S2'. The extra heart sounds are heard in both normal and abnormal situations.

The followings are some types of murmurs in abnormal hearts.

There will be wildly split sounds by the pulmonary hypertension, continual sobbing sounds by congenital cardiopathy like the patent ductus arteriosus and a heart murmur and a whooshing sound between the normal lub-dub of the heartbeat by the mitral valve prolapse.

You can check various types of PCG (phonocardiogram) via computers with JABES Analyzer, and moreover auscultate easily owing to lots of waveforms of heart murmur and professional interpretations.

There are 4 auscultatory areas of heart auscultation.

Aortic valve

You can listen to the most suitable sounds of the aortic valve. Aortic valve lies between the left ventricle and the aorta. The closure of the aortic valve contributes the A2 component of the S2 with the P2.

Pulmonary valve

You can listen to the most suitable sounds of the pulmonary valve. Pulmonary valve lies between the right ventricle and the pulmonary artery. The closure of the pulmonary valve contributes the P2 component of the S2 with the A2.

Tricuspid valve

You can listen to the most suitable sounds of the tricuspid valve. The tricuspid valve is on the right side of the heart, between the right atrium and the right ventricle. The closure of the tricuspid valve contributes the T1 component of the S1 with the M1.

Mitral valve

You can listen to the most suitable sounds of the mitral valve. The mitral valve is a dual flap valve in the heart that lies between the left atrium and the left ventricle. The closure of the mitral valve contributes the M1 component of the S1 with the T1.

Valvular disease

The heart's four valves composed of thin leaflets help the blood to move forward to its next destination and prevent a backflow of it.

What are the four heart valves?

1. The aortic valve is between the left ventricle and the aorta.
2. The pulmonary or pulmonic valve is between the right ventricle and the pulmonary artery.
3. The tricuspid valve is between the right atrium and right ventricle.
4. The mitral valve is between the left atrium and left ventricle.

The valvular disease is caused by a defective heart valve that fails to close or open properly, and this heart isn't able to work fully to direct the flow or prevent a backflow.

A number of conditions can lead to heart valve disease, but rheumatic fever is among the most common. (The rheumatic fever is unrelated to the rheumatic arthritis.) The rheumatic heart disease is one of the complicating diseases that originated from streptococcal infections. The opening of the valve is too narrow by rheumatic fever, and this interferes with the forward flow of blood - a condition called valvular stenosis - and becomes worse even to stiffen (cardiac failure).

The valvular disease in the mitral valve is among the most common and the most common symptom is the stenosis. Therefore valvular disease often means mitral stenosis.

Drugs to treat heart valve disease do not provide a cure, so surgery to replace the defective valve may be recommended. Depending upon the severity of the disease, a doctor may decide some treatments or surgery, so it's very important to see a doctor regularly.

In daily life, it is recommended to avoid strenuous activities and getting cold or to say about the valvular disease to a dentist.

B. Breath sounds

The two lungs are located in the chest on either side of the heart. Both are separated into lobes, with three lobes (an upper lobe, a middle lobe and a lower lobe) on the right and two (an upper lobe and a lower lobe) on the left. They transport oxygen from the atmosphere into the bloodstream, and to release carbon dioxide from the bloodstream into the atmosphere. This exchange of gases is accomplished in the alveoli.

The abnormal lungs generate many distinctive sounds such as crackles by asthma or wheezes by organic pulmonary disease.

You can distinguish these sounds exactly with keeping up study and eagerness.

Even though you have little clinical experience, you can be experts with JABES Analyzer which has abundant sample data of various types of sounds.

Breath Sounds

Breath sounds	Medical terms	factors	Disease
Crackles	Rale Crepitation	The excessive airway obstruction	bronchitis, respiratory infection, pulmonary edema, atelectasis, fibrosis, congestive lung disiese
Wheezing	Sibilant rale Musical rale Sonorous rale Low-pitched wheeze	rapid air currents by respiratory obstruction	asthma, pulmonary edema, bronchitis, congestive lung disiese
Rhonchus		passing respiratory obstruction	bronchitis
Pleural friction rub		pleural inflammations	pneumonia, pulmonary infarction

Features of breath sounds in each lung disease

disease	Features of breath sounds
asthma	a long expiratory phase time, wheezing, a decrease of respiration
pulmonary emphysema	a decrease of respiration, a decrease of vocal fremitus
chronic bronchitis	early crackles, rhonchus
pneumonia	matured crackles, bronchial breathing
pulmonary embolism	mostly normal

pulmonary edema	early crackles, wheezing
pneumothorax	weak sounds of respiration
pleural fluid	weak sounds of respiration
atelectasis	weak sounds of respiration
respiratory failure	normal in the early stage, crackles and a decrease of respiration in the later stage

C. Abdominal sounds

The intestines make the bowel sounds like gurgling, rumbling, or growling noises normally. The majority of the bowel sounds are harmless, but in some cases very loud rumbling sounds like a thunder are generated by the intestinal atresia following postoperative ileus .

If patients have peritonitis, there will be low sounds. There will not be abdominal sounds with a volvulus, because of a poor circulation of the blood by a twist in the intestines just before a necrosis.

If you put pressure lightly upon an umbilical region of a patient who have an abdominal aortic Aneurysm, there will be bounces of intestines and heard blowing murmur or a whooshing sound through a stethoscope.

You also listen to the murmur of abnormalities of renal artery.

If patients have severe arteriosclerosis of the common carotid artery (located inside the neck), you will be heard sobbing sounds by a poor circulation of the blood with the JABES electronic stethoscope of bell mode.

5. The electronic stethoscope

A domestic academy analyzed consumers' propensity to purchase the stethoscopes by the request of GS Technology.

The result is that 'the sound' is the most important point to choose the stethoscope by about 150 participants in that survey. Because the stethoscope was designed to listen to heart or breath sounds clearly, it has been developing to devices with good sound systems.

In these days, medical electronics introduce digital technology in various areas according to the advance of electronics, whereupon the electronic stethoscope has been producing and changing the market.

The stethoscope is a simple device to diagnose but important, so it's important to select a good one.

There are good check points to purchase the electronic stethoscope.

1. Are the sounds clear and bigger? You should avoid electronic stethoscopes generating white noise, and choose the ones certificated by the powerful Agency like FDA.
2. Dose it have a filter to distinguish the sounds of heart, lungs and other organs?
3. Does it run with common AAA Alkaline batteries? Even a stethoscope works well, it's very inconvenient to use one required expensive and hard to purchase lithium batteries for camera.

4. Is it light? The electronic stethoscope shouldn't be weightier than an acoustic one to carry it all the times.
5. Does the company of the stethoscope have convenient A/S system?
Choose the trustful company even more expensive not an insolvent enterprise.
6. Is it easy to connect to a computer and does it have useful software?
7. **You shouldn't choose it with LCD screen involving lots of risk to be broken. In addition, you should also avoid it with a sensor instead of a diaphragm because of weakness.**

- The end -