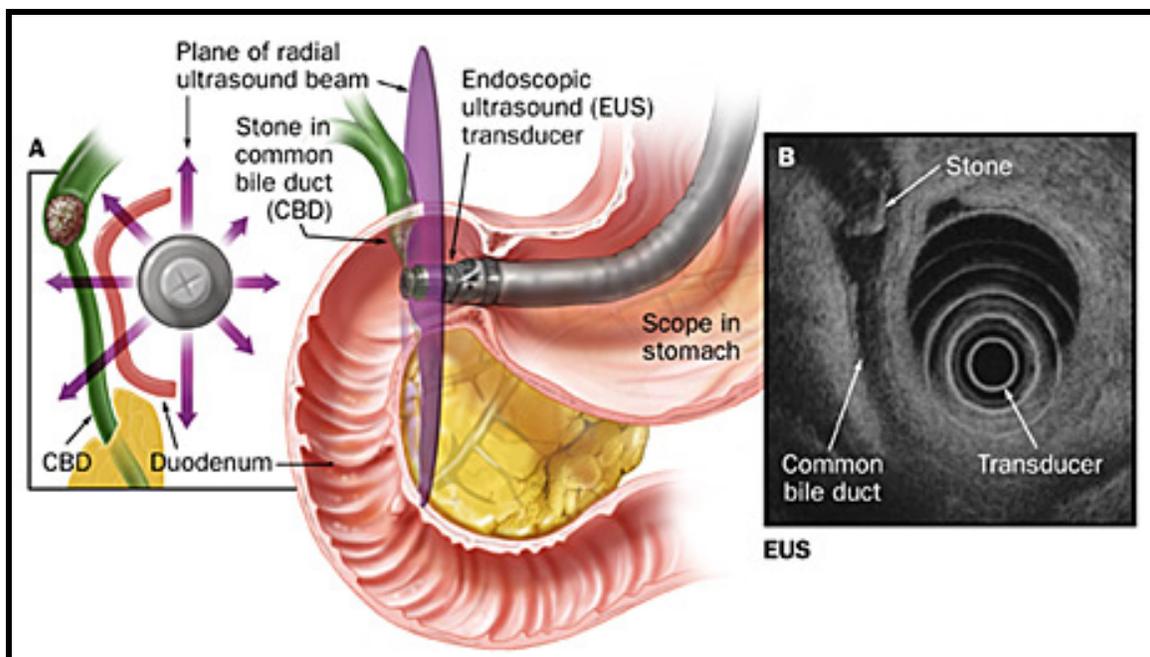


ENDOSCOPIC ULTRASOUND (EUS)

Endoscopic Ultrasound (EUS) combines endoscopy and ultrasound in order to obtain images and information about the digestive tract and the surrounding tissue and organs. Endoscopy refers to the procedure of inserting a long flexible tube via the mouth or the rectum to visualize the digestive tract, whereas ultrasound uses high-frequency sound waves to produce images of the organs and structures inside the body such as ovaries, uterus, liver, gallbladder, pancreas, aorta, etc.

Traditional ultrasound sends sound waves to the organ(s) and back with a transducer placed on the skin overlying the organ(s) of interest. Images obtained by traditional ultrasound are not always of high quality. In EUS a small ultrasound transducer is installed on the tip of the endoscope. By inserting the endoscope into the upper or the lower digestive tract one can obtain high quality ultrasound images of the organs inside the body.

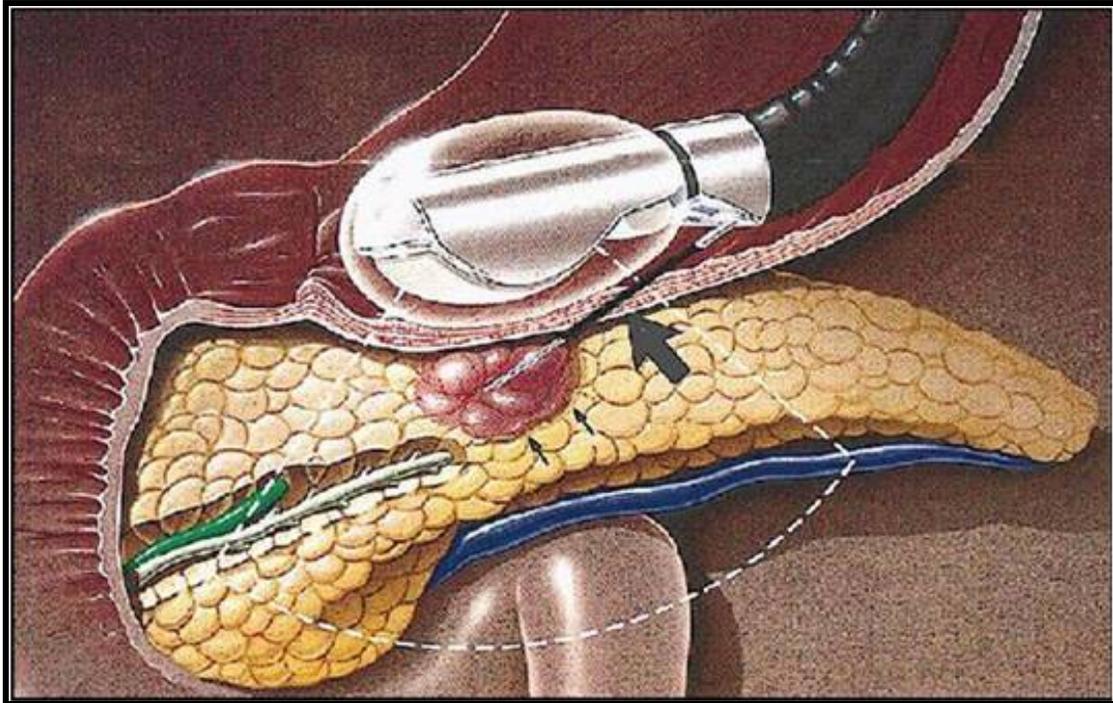
Two types of EUS scopes are used: radial (for diagnostic purposes only) and linear (for diagnostic and therapeutic purposes). Placing the transducer on the tip of an endoscope allows the transducer to get close to the organs inside the body. Because of the proximity of the EUS transducer to the organ(s) of interest, the images obtained are frequently more accurate and more detailed than the ones obtained by traditional ultrasound. The EUS also can obtain information about the layers of the intestinal wall as well as adjacent areas such as lymph nodes and the blood vessels.



RADIAL EUS OF COMMON BILE DUCT

Other uses of EUS include studying the flow of blood inside blood vessels using Doppler ultrasound, and to obtain tissue samples by passing a special needle, under ultrasound

guidance, into enlarged lymph nodes or suspicious tumors. The tissue or cells obtained by the needle can be examined by a pathologist under a microscope. The process of obtaining tissue with a thin needle is called fine needle aspiration (FNA).



LINEAR EUS AND FNA OF PANCREAS

USES FOR EUS

- Staging of cancers of the lung, esophagus, stomach, pancreas and rectum.
- Evaluating chronic pancreatitis and other masses or cysts of the pancreas.
- Studying bile duct abnormalities including stones in the bile duct or gallbladder, or bile duct, gallbladder, or liver tumors.
- Studying the muscles of the lower rectum and anal canal in evaluating reasons for fecal incontinence.
- Studying 'submucosal lesions' such as nodules or 'bumps' that may be hiding in the intestinal wall covered by normal appearing lining of the intestinal tract.

Staging of cancer is becoming an important use of EUS. The prognosis of a cancer victim is related to the stage of the cancer at the time of cancer detection. For example, early stage colon cancer refers to cancer confined to the inner surface of the colon before it is spread to adjacent tissues or distant organs. Therefore early stage colon cancer can be completely resected with good chances for cure. However, if cancer is detected at later stages, the cancer tissues have already penetrated the colon wall and invaded neighboring organs and lymph nodes, or have spread to distant organs such as liver and lungs. EUS can provide information regarding the depth of penetration of the cancer and spread of cancer to adjacent tissues and lymph nodes, information useful for staging.

PREPARATION FOR EUS

Your doctor will want to know about your health status, especially if you have any allergies, other significant health problems such as heart disease, lung disease, diabetes mellitus, etc. You will also be inquired about allergies to iodine or shellfish as, under certain circumstances, iodine containing contrast material may be used. If there is a possibility of fine needle aspiration (FNA), the doctor will want to check your blood for proper clotting. It is important to inform your doctor of any family history of bleeding problems or if you are taking medications that interfere with blood clotting (such as Coumadin) or platelet function (such as aspirin, Plavix, ibuprofen, Aleve, and other NSAIDs). Inform your doctor of any prescription or non-prescription medication you might be taking. Antibiotics are not required except in certain situations where FNA is performed.

EUS is performed with sedation so you will not be able to return to work or to drive for 24 hours. It also means that you will need someone to take you home as this is usually an out-patient procedure.

You will need to have an empty stomach (no oral intake for 6 or more hours before the procedure). In case of a rectal EUS you will probably need to take some enemas or laxatives. In either case, full instructions will be given to you.

WHAT TO EXPECT DURING EUS

Upon arrival at the endoscopy center, the nurse or the doctor will discuss the procedure and answer any questions. You will then be asked to sign a consent form indicating you were informed about the procedure, its alternatives, and its risks. An IV will be placed in a vein and kept open with a slow drip of IV fluid. An anesthesiologist will monitor you throughout the procedure and administer sedation through the IV. You will then be taken into the procedure room and small electrode patches will be placed on your skin for the monitoring of your blood pressure, pulse, and blood oxygen throughout the procedure.

A bite block will be placed to protect your teeth and the scope, and once asleep, the EUS scope (called an echoendoscope) will be inserted through your mouth. The physician will observe the inside of your intestinal tract on a TV monitor and the ultrasound image on another monitor. The entire procedure generally takes 30 to 90 minutes depending on the complexity and whether fine needle aspiration (FNA) is performed.

After the procedure you will be sleepy for up to one hour and be unable to drink or walk. Once you are fully awake, the doctor will discuss with you and your escort the findings of the procedure. Barring any rare complications, when you are fully awake, your companion will be able to take you home where you should rest for the remainder of the day. Light meals and fluids are allowed. The bloating which you may feel from the insufflated air will only be temporary. Should your throat be mildly sore, for a day or two, salt-water gargles will provide relief.

You should call your doctor if concerned about your progress or having severe pain, vomiting, passage or vomiting of blood, chills or fever. If EUS was particularly difficult

or complicated you may be kept in the hospital overnight. The endoscopist will discuss this with you when you wake up.

COMPLICATIONS OF EUS

Like other endoscopy procedures, EUS is safe and well tolerated, but no procedure is without risk. Complication rate for EUS without the fine needle aspiration is rare (approximately 1:2000 chance). This is similar to the complication rate of other endoscopy procedures. Sometimes, patients can develop reactions such as hives, skin rash or nausea to the medications used during EUS. A lump may appear in the area of the vein where the IV was placed. This usually resolves over time. Should it persist, you should contact your physician. The main complication of serious note is perforation (making a hole in the intestinal wall) that may require surgical repair. This is quite rare and all precautions are taken to avoid it.

When FNA is performed complications occur more often but are still uncommon (0.5-1.0%). Passing a needle through the gut wall may cause minor bleeding. If unusual bleeding occurs, the patient may be hospitalized briefly for observation, but blood transfusions are rarely needed. Infection is another rare complication of FNA. Infection can occur during aspiration of fluid from cysts and antibiotics may be given before the procedure. If the FNA is performed on the pancreas, pancreatitis (inflammation of the pancreas) can rarely occur. Pancreatitis calls for hospitalization, observation, rest, IV fluid, and medication for abdominal pain. It usually resolves spontaneously in a few days.