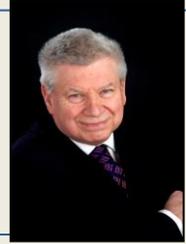


Medicine for Managers

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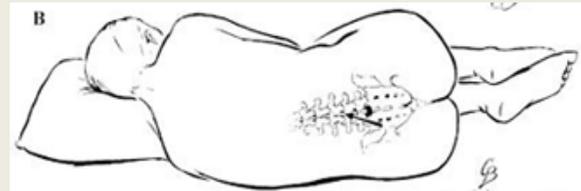
Lumbar Puncture

Lumbar puncture as a technique has been part of medical practice since the 1890s although, with the advent of neuro-imaging techniques it is used less frequently than it used to be. The technique is simply the insertion of a needle into the lower part of the spine as part of the investigative procedure for disorders of the brain and spinal cord.

The brain and spinal cord is bathed in cerebro-spinal fluid (CSF). During the procedure a sample of the CSF is withdrawn and can be tested to assist in the diagnosis or exclusion of a variety of conditions including meningitis (infection of the membranes which surround the brain and spinal cord) or a subarachnoid haemorrhage (a bleed occurring in or around the brain).

The same technique can also be used in the treatment of some conditions such as injecting antibiotics or chemotherapeutic agents in the CSF.

The procedure is performed under sterile conditions. The patient is placed lying on the left or right side (called the left (or right) lateral position) with the neck bent downwards and the knees drawn up to the chest.

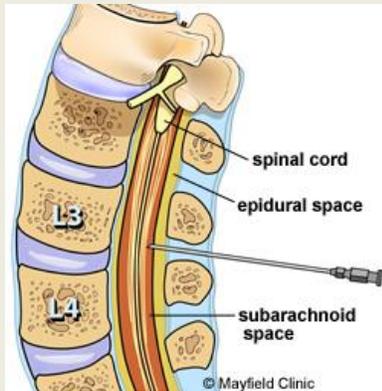


Some operators prefer that the procedure is carried out with the person sitting on a stool or table leaning slightly forward.

The area of skin is then carefully cleaned using an appropriate disinfectant and the point of insertion of the needle is palpated using the finger to identify the bony landmarks.

The area of insertion is then infiltrated with local anaesthetic.

The needle is then actually inserted in the space between two vertebrae, normally the third and fourth lumbar or the fourth and fifth lumbar.



The needle passes through the skin and the tissue beneath until it reaches the **ligamentum flavum** which connects adjacent vertebrae. Once through it, the needle 'gives' and can be progressed until it reaches the outer layer of the meninges, called the **dura mater**.

Once through the dura mater the needle 'gives' again. The middle layer of the meninges, the **arachnoid mater** is very thin and is normally adherent to the dura mater and so the needle, once through the dura mater, will also have penetrated the arachnoid mater.

The tip of the needle will then be in the subarachnoid space. Once in position, a thin wire located in the needle (to prevent the needle blocking during its insertion) can be withdrawn and drops of the cerebro-spinal fluid can be collected. If required the pressure of the cerebro-spinal fluid can be measured by connecting a simple pressure gauge (manometer) to the needle.

The positioning of the needle to withdraw fluid is very similar to the needle position for

administering spinal anaesthesia. In spinal anaesthesia local anaesthetic is injected into the subarachnoid space, close to the nerves (see diagram opposite) and is a single anaesthetic injection. (This is not the same as epidural anaesthesia where the anaesthetic is placed through a catheter into the **epidural space** which is the space outside the dura mater between the meninges and the vertebral wall).

Results of a Lumbar Puncture

Analysis of the cerebro-spinal fluid will include cell count, glucose and protein levels and the fluid is often sent for culture if any sort of infection is suspected.

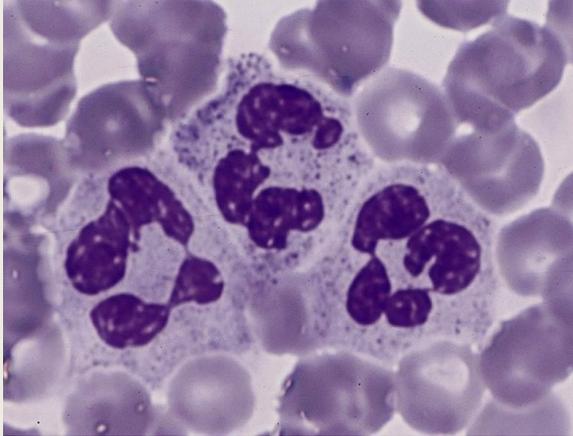
If the **pressure** in the CSF is raised (as indicated by manometer measurement) it may indicate a number of possible diagnoses including bruising of the brain (cerebral oedema), a subarachnoid bleed, or some types of bacterial or tuberculous meningitis.

Colour and Viscosity

The CSF itself may appear clear or may be discoloured yellow (with some types of meningitis) or brownish (following a bleed). It appears viscous in the less acute types of meningitis (e.g. tuberculous or fungal).

Cellular content

The presence of white blood cells may suggest pathology. The presence of polymorphs (stained



blue in the example above) indicates bacterial meningitis. They also increase in cases of bleeding in the nervous system and they often contain broken down old red blood cells, called **erythrophagocytosis** (ghastly word of the day). The fluid may also be sent for culture to identify any causative bacteria in cases of bacterial meningitis.

With modern techniques it is possible identify viruses such as *herpesvirus* or *enterovirus*. It can also be used to identify more rare causes of symptoms such as *Treponema pallidum*, the causative bacterium of syphilis.

CSF Chemistry

Glucose: usually in concentrations of 60% of the peripheral blood. It is reduced in infections and increased in diabetes.

Protein: total protein content can result from various disturbances in CSF circulation and may indicate infections such as meningitis or neurosyphilis, brain abscesses, bleeding and Guillain-Barré syndrome.

Analysis of the CSF is a very important stage in the diagnosis and management of many neurological disorders and certainly controls the choice of antibiotics in many bacterial meningitides.

Lumbar Puncture is a very simple and safe procedure. The most common complications are headache and nausea. The headache may often be relieved by lying down and generally settles quite quickly.

Serious complications are exceedingly unusual and, on the rare occasions that they occur, are due to bleeding into the epidural or subarachnoid space. There have been reports of muscle weakness caused by nerve damage but they are absolutely exceptional.

Lumbar puncture remains an important element in the diagnosis of neurological disorders although these days it is combined with scans and other investigations to achieve more rapid and accurate diagnoses.

As I said earlier in the article, the procedure is described as being associated with minimal discomfort. It is therefore with some uncertainty that I conclude with a quote from *Pandora Poikilos* in her book *“Excuse Me, My Brains Have Stepped Out”*. She says:

“I have a needle being stuck into my spine, can anyone please define ‘a little pain’?”

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