Lymphatic Drainage of the Head and Neck

In addition to the intricate vascular tree of arteries and veins, there is another system of vessels known as the lymphatic system. The function of this system is anatomically and physiologically related to that of the circulatory system.

Tissue Fluid

All of the tissues of the body are bathed in tissue fluid. The tissue fluid that is not within the blood vessels is termed extravascular fluid. It serves as a medium through which nutrients, electrolytes, and waste products can pass to and from cells and vessels. The fluid within blood vessels is termed intravascular fluid. Intravascular fluid is composed of plasma, blood cells, electrolytes, and protein. When intravascular fluid moves from the intravascular area to the extravascular area by the process of osmosis, it is then termed extravascular fluid.

Extravascular fluid is different from blood or intravascular fluid. Normally, it contains no red blood cells and a different percentage of white cells, electrolytes, and proteins. Extravascular fluid returns to the intravascular space by the same process, osmosis. In normal circumstances, the volume of the fluid within the vascular tree and the volume of fluid in the tissue spaces remain unchanged. The two fluid "compartments" are in balance and physiologically dependent on one another.

The fluid in the tissue spaces that is returning to the circulatory system returns primarily by way of the veins and lymphatic system. Physical activity and the milking action of the muscles promote fluid flow in these two types of vessels.

Venous return to the heart is enhanced by a strong heart. Aside from those in the head and neck, veins have valves at various intervals to prevent backflow of blood as it is returning to the heart. Anything that reduces flow of fluid in the veins and lymphatic vessels will reduce their ability to carry as much fluid in a given unit of time. In such a situation, tissue fluid flow is decreased, and less is picked up from the tissues. Thus, more fluid will accumulate in the tissues. Swelling or edema will be the result. People with failing hearts or clots in the leg veins (thrombophlebitis) will have thick, edematous ankles and legs. This ankle edema is merely an accumulation of tissue fluid.

Components of the Lymphatic System

The lymphatic system consists of lymphatic capillaries, vessels, nodes, lymphatic organs, and lymph.

Lymphatic Capillaries

The lymphatic capillaries are small lymph vessels located throughout the body. They collect the tissue fluid and coalesce into large vessels much the same as the venous system is arranged. Small vessels flow into larger vessels.
**Lymphatic Vessels**

The collecting system that ultimately returns its contents to the blood stream is composed of lymphatic vessels. Most of the lymphatic vessels flow into the *thoracic duct* which empties into the junction of the left internal jugular vein with the left subclavian vein. The thoracic duct carries all the lymph except that from the right head, right neck, right thorax, right arm, right lung, and right side of the heart. It is a thin-walled tube extending from the lumbar vertebrae to the root of the neck. It is situated close to the spine as it courses superiorly.

Lymph not drained by the thoracic duct is drained by the *right lymphatic duct*. The right lymphatic duct empties into the junction of the right subclavian vein with the right internal jugular vein. It is a short vessel, approximately 1 to 1.5 cm long.

**Nodes**

Small bean-shaped bodies, usually in groups but sometimes alone, are positioned along the course of the lymph vessels. Their function is to filter the lymphatic fluid flowing through them. Also, they produce and discharge lymphocytes, one type of white blood cell used in body defense against infection. Even though these assorted groups of nodes have wide and varied communications, the lymph drains in a relatively specific pattern toward the main collecting ducts.

**Lymphatic Organs**

Certain organs in the body resemble the lymph nodes and serve much the same function. The tonsils and adenoids are examples. The spleen contains lymphatic tissue. The thymus gland also has lymphatic connections, but no function for this organ has been definitely determined.

**Lymph**

By definition, lymph is the fluid found only in the closed lymphatic vessels. It is a transparent, colorless, watery fluid closely resembling blood plasma. Lymph is more dilute than plasma and lacks some of the protein and other elements found in plasma.

**The Lymphatic System of the Head and Neck**

As in other parts of the body, lymph in the head and neck is carried by the very thin-walled lymph vessels to aggregations of nodes. From the nodes it drains to other areas and ultimately into the thoracic duct or right lymphatic duct. Various groups of nodes located in specific areas drain the local tissues.

For ease of learning, the nodal system of the head and neck can be divided into groups of nodes according to location.
Occipital Nodes

Located near the occipital protuberance, the occipital nodes drain the occipital portion of the scalp and empty into the cervical nodes.

Posterior Auricular Nodes

The posterior auricular nodes drain the mastoid region.

Anterior Auricular Nodes

The anterior auricular group drains the temporal region and skin of the ear.

Parotid Nodes

Several nodes are located around and in the parotid gland. They drain the nasal cavities, eyelids, frontotemporal region, posterior palate, anterior auricular nodes, and parotid region.

Facial Nodes

Several groups of nodes are located in the facial structures. Most of these drain into the submandibular nodes.

Submandibular Nodes

The submandibular nodes lie near the inferior border of the mandible. They collect lymph from the submental region, upper and lower teeth, tongue, lips, and jaws and drain into the deep cervical nodes.

Submental Nodes

The unpaired submental group lies in the submental triangle between the anterior bellies of the digastric muscles. These nodes drain the lower incisors and empty into the submandibular and deep cervical nodes.

Cervical Nodes

Various groups of nodes are located along the internal and external jugular veins. They are divided into superficial and deep cervical nodes. The superficial nodes are usually found in the upper region of the neck. They receive lymph from the ear and adjacent regions. The deep cervical nodes are further subdivided into superior and inferior deep cervical nodes. Lymph from the base of the tongue and posterior floor of the mouth drains directly into these nodes. From the auricular nodes, submandibular nodes, submental nodes, facial nodes, occipital nodes, and viscera of the neck, lymph drains into the deep cervical nodes. On the right, lymph from the deep cervical nodes empties into the right lymphatic duct. The thoracic duct collects lymph from the left deep cervical nodes.
Clinical Notes

Knowledge of the lymph system and the geography of the various groups of nodes is important in diagnosis. In the resting normal state lymph nodes are not palpable. Infection or cancer in an area drained by the vessels to these nodes causes the nodes to become very active, and they become quite firm and palpable. Palpable nodes are a most important sign of clinical disease.

The cause of palpable lymph nodes should always be investigated. Pain and swelling of the submandibular nodes are clearly indicative of oral pathology. In addition, we can predict that the pathological condition, if left untreated, will spread and involve the cervical nodes. Infection in the area of the scalp may be the cause of palpable occipital nodes. Malignancy is also a common cause of palpable nodes. Cancer cells often spread to regional lymph nodes and produce seeding and growth of the tumor within the nodes. Identification of palpable lymph nodes can result in early diagnosis and thereby improve the prognosis.