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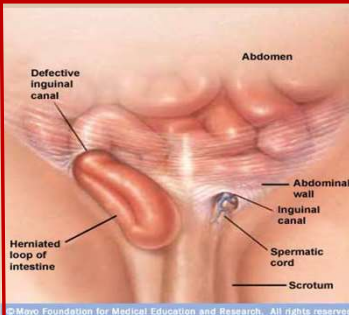
Inguinal Hernia Pathophysiology

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Inguinal Hernia

Inguinal hernia (IH) is a weakening of the abdominal contents into the inguinal canal of the groin that causes a visible outward protrusion. According to a five-year study conducted by Burcharth et al with findings reported in 2013 and revised in 2015, 46,717 people reported inguinal hernias needing repair nationally in the United States. This topic of inguinal hernia was picked due to a vast number of complaints pertaining to inguinal hernias found in the emergency department. This specific type of hernia is something that can affect both males and females. **Out of the United States population affected by inguinal hernia, 9.2% were female and 90.8% were male** (Vacca, JR., 2017). There are a multitude of factors that can be the cause of someone's inguinal hernia.



The Mayo Clinic (2018). Inguinal Hernia [online image]. Retrieved from <https://www.mayoclinic.org/diseases-conditions/inguinal-hernia/symptoms-causes/syc-20351547>

Possible Causes

- Stress
- Increased use of abdominal muscles
- Increased oxygen demand by the body
- Metabolic muscle disorders
- Chronic muscle inflammation
- Nutrition deficits
- Free radical exposures
- Race
- Age
- Metabolism
- Family history
- Previous injury to the groin muscles
- Low body mass index (BMI)

Signs and Symptoms

The patient may have an obvious bulge or protrusion from the groin area as a sign of IH. Some people can have pain while others do not. This can be a sharp or dull pain to the area of protrusion. Pain may also radiate to the testicular sac for males due to compression on the nerve endings. Another sign of IH is limitations with movement. Patients may not have full range of motion of their legs or be limited when bending over. Fullness or pain can increase by going up stairs, extended periods of walking, sneezing, and/or coughing. Pain is mostly relieved by rest (Burcharth, Pedersen, Bisgaard, Pedersen, & Rosenberg, 2015)

Nursing Care Implications

- Extreme pain could be a sign of strangulation of the bowel caused by IH
- Monitor for Tachycardia and Increased blood pressure. This may mean there is decreased blood flow to the bowel caused by IH
- Note that the patient should experience mild pain caused by pressure being applied to the nerves or the groin area. Pain may also be from bradykinin secreted during inflammation.
- Non-steroidal anti-inflammatory medication (NSAID) might be the best pain management medication.
- The common surgical repair method is open reduction with mesh use.
- The patient may have bruising post-surgical repair. Especially to sites lower than the surgical site, such as the testicles.
- Monitor for fevers and drainage from the surgical site. This may be a sign of infection.
- Patients will be on lifting restrictions for about two weeks post-op.

Pathophysiology

Once a person turns 18 years-old, the risk for inguinal hernia increases to 0.25% (Wei et al., 2018, p. 1). This increases throughout the lifespan until age 75 years-old where hernia risk reaches its peak at 4.2%. As for the population, 27% who have inguinal hernias are male, 3% are female (Wei et al., 2018).

It is not entirely known why IH occurs (The Mayo Clinic, 2018). There are multiple factors that contribute to this weakening of the groin muscles. Stress or increased use of the abdominal muscles can cause IH. **The main reason behind IH is muscular damage** (The Mayo Clinic, 2018). In the cells of the muscle, multiple problems may occur leading to damages. A patient might have developed some form of inflammatory muscle disease like **myositis** caused by a virus, bacteria, or parasite. This is where the muscle fibers accumulate multiple proteins creating weakness and pain to the muscles (McCance & Huether, 2014). With this issue, the muscle would be prone to injury due to the increase in stress towards the endoplasmic reticulum from the extra proteins the pathogen is creating in the body. Over usage of the muscle can cause the muscle to become weak and inflamed. The muscle requires more oxygen during this process and if the higher oxygen demands are not met, cellular death may occur. During the **inflammatory process**, the muscle can be easily displaced causing the bowel to protrude which shows the initial bulge creating IH (Mahabiz, 2017). As someone ages, their muscles become progressively weaker and are more likely to give out faster than in their younger years. This is mainly due to changes in the cellular growth process brought on by free radicals (Burcharth et al., 2015). The longer a person lives, the more likely changes can happen in their cellular DNA. Also, as someone ages they may be less active or mobile causing **atrophy** of their muscles. This is a normal process where cells decrease in size since there is not a high demand of use (McCance & Huether, 2014).

An additional factor is a person could have severely weakened muscle tone due to a metabolic issue within the muscle. Metabolic muscle disorders like **McArdles disease** can play a part in weakened muscles of the body (Mahabiz, 2017). The muscle has a deficiency with glycogen storage causing the muscle to become weakened and injure easily. These disorders are generally genetically inherited. This means, offspring of someone with a metabolic muscular disorder are likely to have this disorder and can have IH at some point in their life. For instance, McArdles disease is autosomal dominant meaning there is a 50/50 chance of spreading it to a person's children (McCance & Huether, 2014).

Significant of Pathophysiology

A hernia could be large enough to block arterial blood flow to the area of the hernia sac. This would be considered **strangulation**. This is a life-threatening issue that should be treated surgically right away. When IH happens, not only can the muscle be affected, but so can the lymphatic system (The Mayo Clinic, 2018). Changes in both the venous system and lymphatic system can cause increased tissue permeability and cause an influx of sodium ions. As the cellular tissue brings in sodium, it will also attract fluid buildup (McCance & Huether, 2014). This would be considered **edema**. This edema would be part of the initial inflammatory process along with pain from the kinin system's release of bradykinin (McCance & Huether, 2014).

As blood flow decreases to the areas affected by the hernia, so does the oxygen supplied to that area. When the body begins to notice a decrease in oxygen, the cells begin to run on **anaerobic metabolism** (McCance & Huether, 2014). As mentioned, edema happens because of an influx of sodium as well as calcium into the cell. Once the cell is filled with fluid that has moved into the cell via osmosis, the cell will burst. As more and more cells die by anaerobic metabolism, **necrosis** takes place as cellular autodigestion happens (McCance & Huether, 2014). As more and more cellular tissue begins to be destroyed, protein pigment will be released into the blood stream and extracellular space. This protein pigment is called creatine kinase (Mahabiz, 2017). This process of muscle degradation is called **rhabdomyolysis**. These protein molecules would in-turn be hard for the body to process, mainly the kidneys (Mahabiz, 2017). The kidneys act as the filtration system for the body and the protein pigments will be too hard on the kidneys. This can lead to **renal damage or possibly failure**.



Mendoza, J. (2018). Inguinal Hernia Treatment [online image]. Retrieved from <https://www.internisto.com/inguinal-hernia-treatment>

Conclusion

Inguinal hernia (IH) is a medical problem that affects both males and females. Predominantly seen more in Caucasian males, IH is a condition where the groin muscles become injured and a portion of the bowel or fat tissues protrude causing a bulge to appear in the groin. This condition can be painful and affect activities of daily living. Constipation, limited range of motion, and pain are some of the symptoms related to IH. Complications can arise from IH such as strangulation of the hernia where blood supply is cut off to the herniated area due to swelling and edema. A medical provider should order a computed tomography with contrast dye to make sure the area is not affecting the vascular system and to see the size and extent of the hernia. IH can be caused by several factors including overuse of the groin muscles, constipation, nutrient deficiencies, genetic issues, metabolic muscle disorders, and aging. Surgical treatment is the primary treatment for someone with IH. The most helpful surgical option is to reduce the hernia with mesh. This surgery is relatively simple with a quick recovery phase. Patients should be aware of post-operative instructions on how to care for the incision and how to prevent IH from reoccurring.

References

