



A Keystone Flap as A Reconstructive Option for Anterior Abdominal and Inguinal Defect

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ABSTRACT

Keywords:

Keystone Flap; Abdominal Wall; Inguinal

The keystone flap is an effective solution to this by utilizing local tissue similar to a keystone to close the defect without the need for tissue transfer from other locations in the body. This makes it a highly effective option in reconstructing complex defects of the anterior abdomen and inguinal region, supporting complete patient recovery. This study aims to determine the effectiveness of using keystone flaps in covering large defects in the abdominal and inguinal walls after tumor removal. This study used a descriptive method with a retrospective approach. Data collection techniques in this study were literature study, observation and patient medical records. The data that has been collected is then analyzed in three stages, namely data reduction, data presentation and conclusion drawing. The results showed that the keystone flap can be used to cover extensive damage to the abdominal and inguinal walls after tumor removal with success. The keystone flap is a reasonably easy defect reconstruction, is very reliable, and has low morbidity and complications.

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Introduction

Abdominal wall defects are conditions where there is an abnormality or defect in the structure of the abdominal wall, which can be caused by various factors such as congenital abnormalities, injury, infection, or after surgery. These defects can be hernias, where part of the internal organs protrude through an opening in the abdominal wall, or they can be larger defects that require reconstruction. Symptoms may include pain, swelling and impaired function of internal organs. Treatment of abdominal wall defects usually involves surgery to repair the defect and restore normal function and aesthetics of the abdominal wall, taking into account the size and location of the defect and the general health condition of the patient. Advanced surgical skills and precise anatomical knowledge are essential for plastic surgeons to optimize pre- and postoperative patient outcomes (Mackenzie et al., 2021). Rigorous discipline and medical acumen are required to plan and execute procedures with precision, and to manage

complications that may arise. Plastic surgeons must deeply understand anatomical structures and advanced surgical techniques to achieve optimal aesthetic and functional outcomes, while ensuring patient safety and recovery. These skills also support in pre-operative assessment and effective post-operative care, thereby improving the patient's overall quality of life (Bielicki et al., 2021).

One of the causes of abdominal defects in tumour surgery, where the removal of the tumour may leave a large defect in the abdominal wall. In these cases, the keystone flap becomes an effective solution for reconstruction (Rao, 2015). The keystone flap is a local tissue graft technique that utilizes tissue mobilization around the defect area without requiring tissue transfer from other locations in the body. This technique offers several advantages, including increased blood flow to the reconstructed area, faster healing, and better aesthetic results. With a keystone flap, the surgeon can close the defect using local tissue similar to the missing area, minimizing complications and speeding up the patient's recovery. The keystone flap is included in reconstructive techniques to treat complex defects, especially on the anterior abdominal wall and inguinal region (Tanjung & Putri, 2021).

Reconstruction of complex defects of the anterior and inguinal abdomen is challenging and technically demanding for reconstructive surgeons. Behan (2003) explains that the keystone flap effectively solves this challenge. This technique uses a local tissue graft shaped like a keystone that allows tissue mobilization around the defect area without needing tissue transfer from another location. With the keystone flap, surgeons can restore the integrity of the abdominal wall, protect the intra-abdominal viscera and prevent herniation. This technique increases blood flow to the reconstructed area, accelerates healing, and provides better aesthetic results, making it an ideal choice for reconstructing complex defects of the anterior and inguinal abdomen (Yoo et al., 2023).

Previous research conducted by Lubis et al. (2020) stated that the transposition flap for mandibular skin loss reconstruction is the best option for closing the defect because it allows effective closure by considering the patient's functional units and aesthetic aspects. This technique allows the transfer of tissue from other areas of the body to the defect area, thus supporting the restoration of mandibular function and aesthetic appearance. The transposition flap provides a more natural result and minimizes complications, making it a top choice in mandibular reconstruction cases.

The Keystone flap as a reconstructive option for anterior and inguinal abdominal defects lies in its ability to overcome technical challenges in reconstruction. The novelty of this study is that the three cases presented demonstrate success in closing large defects of the abdominal and inguinal walls, with increased healing, improved aesthetics, and reduced risk of postoperative complications. So, this study aims to determine the effectiveness of using keystone flaps in covering large defects in the abdominal and inguinal walls after tumor removal.

Research Methods

This study uses a descriptive method with a retrospective approach. The descriptive method is a research method that aims to describe or describe certain phenomena or circumstances as they are (Jayusman & Shavab, 2020). Meanwhile, the retrospective approach is a research method that involves analyzing data or events that have occurred in the past. In

this approach, researchers collect information from existing records, documents, or data, and then analyze them for patterns, relationships, or certain effects (Fernandes & Indramaya, 2018). Data collection techniques in this study were literature review, observation and patient medical records. Three samples with abdominal defects after surgical procedures at Prof Dr RD Kandou Hospital from February to May 2020. The data that has been collected is then analyzed in three stages, namely data reduction, data presentation and conclusion drawing.

Results and Discussion

Tumor is a medical term used to describe abnormal tissue growth in the body. Tumors can be malignant (cancerous) or benign (non-cancerous). Malignant tumors can spread to other parts of the body, while benign tumors tend not to spread and are more limited in their growth (Alrizzaqi et al., 2018). For malignant tumors, surgery is often required to remove the tumor in its entirety or as much as possible, especially if the tumor is amenable to surgery. Surgery may be part of a broader treatment, such as chemotherapy, radiotherapy, or targeted therapy, depending on the specific characteristics of the tumor and the patient's health condition (Wisudawati, 2021).

When a tumor is surgically removed, the surgeon will make an incision to access the tumor and remove it from the body. This kind of surgery may affect the structure of muscles, tissues, and other layers that protect the organs around the tumor (Ung et al., 2019). Tumors come in many different types, one of which is sarcoma. Sarcoma is a type of cancer that originates in soft tissue or bone. This is different from cancers that originate in solid organs such as the lungs, breasts or intestines. Sarcomas can arise in different parts of the body, including muscle, fat, cartilage and other supporting tissues. Sarcomas are often more difficult to diagnose and treat compared to other cancers due to their rare nature and ability to grow around vital structures such as blood vessels and nerves. Sarcoma treatment often involves a combination of surgery, chemotherapy, radiotherapy and targeted therapy, depending on the location and specific characteristics of the tumor (Rengkung et al., 2020).

Sarcomas in the groin and inguinal canal are a type of soft tissue tumor that is often overlooked due to their unusual location and symptoms that may not be specific. A proper diagnosis is often delayed as these sarcomas can manifest as a palpable lump or pain that is initially thought to be a hernia or other more common condition. Treatment can also be difficult as sarcomas often grow around vital structures such as blood vessels and nerves, affecting treatment options and prognosis. The importance of clinical awareness and careful examination in these cases is indispensable to catch and manage these sarcomas effectively (Papanastassiou et al., 2019).

In the abdominal or inguinal (groin) area, it may mean that tissues supporting spinal structures, internal organs or the gastrointestinal tract may be disrupted or cut during the procedure. The result of this manipulation, especially if not performed carefully, can cause damage to the abdominal wall. This damage can affect the strength and integrity of the abdominal wall, allowing organs or tissues to protrude out of their normal place, referred to as a hernia (Putri et al., 2023). To reduce this risk, surgeons usually use proper surgical techniques and pay attention to important details such as how to close the surgical incision. Postoperative recovery often also involves treatments to strengthen the abdominal wall and monitoring for

early signs of complications such as swelling or unusual pain. With the right approach, the risk of damage to the abdominal wall can be minimized (Hu et al., 2023).

Abdominal wall reconstruction refers to a surgical procedure that aims to repair a hernia by restoring the integrity of the damaged or weakened abdominal wall. The procedure involves the use of body tissue or synthetic materials to strengthen the weakened or torn area, which usually occurs due to previous surgery, injury, or other conditions. The aim is to restore the normal function of the abdominal wall, prevent hernia recurrence, and reduce the risk of complications such as infection or long-term discomfort for the patient. Abdominal wall reconstruction often requires careful handling and skilled surgical techniques to achieve optimal results in restoring anatomical structures and ensuring long-term postoperative success (Hope et al., 2023). The importance of covering major damage to the abdominal and inguinal wall after tumor removal is critical to successful postoperative recovery. Here are some reasons why this is important:

Preventing Herniation

Damage to the abdominal or inguinal wall can lead to the formation of a hernia, where internal organs or tissues can protrude through a gap or weakness in the abdominal wall. Hernias often occur after major surgery in this area due to trauma to the tissues. A good and strong closure of the surgical wound is essential to prevent hernias from forming, by strengthening the abdominal wall and reducing any gaps or weaknesses that could allow organs to protrude. With proper technique, such as the use of a Keystone Flap or other closure material, the surgeon can optimize the postoperative healing process and reduce the risk of long-term complications for the patient (Erwin et al., 2023).

Strengthening Structural Support

The abdominal wall and inguinal canal provide important structural support for organs in the body, such as the intestines and other organs. When damage occurs to the abdominal wall, either from surgery or trauma, it can compromise the structural strength and stability needed to keep the internal organs in their proper position (Saiding et al., 2023). Covering such damage effectively and robustly, for example through reconstructive techniques such as the Keystone Flap, can help restore the integrity of the abdominal wall. This not only helps prevent hernias or other problems that can arise, but also ensures that the internal organs can function optimally within a healthy and stable body system (Saiding et al., 2023).

Facilitating Healing

Healing after surgery relies heavily on a supportive environment around the surgical area. Covering the damage effectively, such as by using proper closure techniques or by using the Keystone Flap, helps reduce the risk of infection by preventing contamination and maintaining sterile conditions around the surgical wound (Lutwick et al., 2019). In addition, good closure also promotes faster healing by tightly fusing the wound edges together and facilitating tissue regeneration. Thus, the postoperative healing process becomes smoother and minimizes the possibility of complications that may interfere with the patient's recovery.

Reduced Risk of Complications

Abdominal wall damage that is not properly closed after surgery can increase the risk of serious complications such as infection or tissue leakage. Infection can occur if the surgical wound is open or contaminated, which can cause inflammation and slow down the healing process. In addition, if the abdominal wall is not adequately repaired, especially after tumor

removal or other surgeries involving major manipulation of the tissues, this may lead to future leaks or hernias (Huang et al., 2016). By carefully covering abdominal wall defects and using proper closure techniques, surgeons can reduce the risk of postoperative complications, speed up patient recovery and ensure better outcomes in the long run.

Ensuring Patient's Quality of Life

The success of surgery not only depends on the successful removal of the tumor, but is also greatly influenced by the patient's quality of life after surgery (Królikowska et al., 2022). Effective closure of abdominal and inguinal wall damage after tumor removal is essential to facilitate an optimal healing process. By properly covering such damage, the surgeon can reduce the risk of complications such as hernias and speed up the patient's recovery. This not only improves patients' quality of life by minimizing pain and discomfort, but also allows them to return to normal activities quickly, thus supporting overall recovery and return to productive daily life (Bitnerr et al., 2019).

To cover the surgical incision of a tumor, especially when there is a need to repair or strengthen the abdominal wall in a more complex manner, the Keystone Flap is a reconstructive technique that can be considered. A Keystone flap is a surgical approach that involves transferring tissue or skin from one part of the body to another area to cover or repair a large surgical wound (Kushida-Contreras & Gaxiola-García, 2021). This technique is commonly used to address issues such as large damage to the abdominal wall or to support the postoperative healing process. The Keystone flap can help minimize the risk of complications such as infection, hernia or long-term discomfort by ensuring good and stable closure of the surgical incision (Jovic et al., 2017).

Here are three samples with abdominal defects after surgical procedures at Prof Dr RD Kandou Hospital from February to May 2020.



Figure 1. samples with abdominal defects after surgical procedures

As such, the keystone flap is an effective surgical technique to cover large defects in the abdominal and inguinal walls after tumor removal with good results. The technique involves the use of flexible and strong local tissue to fill the area of damage in a way that minimizes tension on the sutures and provides good structural support. In this way, the keystone flap not only helps prevent hernias by strengthening the abdominal wall, but also promotes rapid healing and facilitates optimal patient recovery, reducing the risk of postoperative complications and improving their quality of life after the procedure.

Conclusion

Keystone flaps can cover large defects in the abdominal and inguinal walls after tumor removal with good success rates. The keystone flap has proven to be a relatively easy, highly reliable, and low morbidity and complication method of defect reconstruction. This method has been identified as an effective reconstructive option for defects in the abdominal and inguinal walls, especially after tumor removal. This technique is not only easy to perform, but also reliable with minimal risk of morbidity and complications, making it a highly recommended option in reconstructive surgical practice.

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