RESEARCH PAPER

# Revisiting The Latissimus Dorsi Pedicle Flap As A Salvage Option For Large Head And Neck Defects: A Case Report

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**ABSTRACT**
Salvage surgery (SS) is a critical intervention for patients with recurrent head and neck cancer, especially after initial treatment failure. There are several ways to close large defects in head Abstract
Salvage surgery (SS) is a critical intervention for patients with recurrent head and neck cancer, especially after initial treatment failure. There are several ways to close large defects in head and neck surgery, such as regional flaps and free flaps. The use of these flaps is based on several considerations depending on the location of the defect itself. Some pedicled flaps have unique advantages for specific defects, sometimes even rivaling the best free flaps. The potential for providing reliable reconstruction, shorter surgery times, and less resource-intensive postoperative care should not be overlooked. The success of defect closure depends on the viability of the transferred tissue used to close the defect. Flaps can be used as a salvage measure if the initial closure is unsuccessful.and neck surgery, such as regional flaps and free flaps. The use of these flaps is based on several considerations depending on the location of the defect itself. Some pedicled flaps have unique advantages for specific defects, sometimes even rivaling the best free flaps. The potential for providing reliable reconstruction, shorter surgery times, and less resource-intensive postoperative care should not be overlooked. The success of defect closure depends on the viability of the transferred tissue used to close the defect. Flaps can be used as a salvage measure if the initial closure is unsuccessful.

**Keywords**: Salvage Option    Pectoralis Major Myocutaneous Flap    Latissimus Dorsi Flap Radical Parotidectomy
Main Subject Head and Neck Surgery Full Text.
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**Case Report**

A 61-year-old man presented with a persistent lump in the right parotid area for 4 years prior to hospitalization. Extraoral clinical examination revealed significant facial asymmetry without facial nerve paralysis. Biopsy concluded that the mass was malignant, and CT scanning showed a solid mass in the parotid measuring 9.5 x 6.9 x 8.2 cm with multiple regional metastases and skin involvement. A total parotidectomy with skin excision was performed, and a PMMC flap was used to cover the entire defect. Within 24 hours after surgery, the PMMC flap developed partial venous congestion, prompting exploration. We decided to discard the flap due to doubts about its viability. Additionally, a latissimus dorsi (LD) flap was selected to reconstruct the defect and as a salvage option. The operation proceeded smoothly, and the LD flap appeared viable.

**Discussion**

The LD flap is a valuable salvage option in head and neck reconstruction due to its flexibility, high success rate, and adaptability to various clinical scenarios. It is particularly useful in cases where other reconstruction options are not feasible.

**Conclusion**

Before performing surgery in the head and neck region, the surgeon should consider how to close the defect. In addition, a salvage option should be prepared in case the initial plan is unsuccessful.

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**Gaphic Abstract**

Background

Salvage options are surgical measures that need to be considered before performing surgery on the head and neck. Closing large defects is a challenge in itself.

Case Report

A 61-year-old man presented with a persistent lump in the right parotid area for 4 years prior to hospitalization. Extraoral clinical examination revealed significant facial asymmetry without facial nerve paralysis. Biopsy concluded that the mass was a malignant tumor, and CT scan showed a solid mass in the parotid gland measuring 9.5 x 6.9 x 8.2 cm with multiple regional metastases and skin involvement. A total parotidectomy with skin excision was performed, and a PMMC flap was used to cover the entire defect. Twenty-four hours after surgery, the PMMC flap developed partial venous congestion, necessitating exploration. A latissimus dorsi (LD) flap was selected to reconstruct the defect.

Discussion

The use of the latissimus dorsi as a salvage option has its own advantages and disadvantages when compared to PMMC or the use of free flaps.

Conclusion

Surgery for head and neck cancer is fraught with challenges but remains an important option for recurrent cases. Lessons learned emphasize the importance of careful patient selection, advanced reconstruction techniques, multidisciplinary collaboration, and continuous innovation to optimize outcomes and improve patients' quality of life.

## INTRODUCTION

Closing defects after surgery in the head and neck region is a consideration for developing countries. The ease of harvesting and economic nature are factors to consider. The choice of flap depends on several factors, including the size, location, and nature of the defect, as well as patient-specific considerations such as comorbidities and previous treatment history (Haas & Scharnagl, 2008). The background to this case is the rescue that had to be performed to close an unsuccessful surgical defect using an initial flap.

Parotid carcinoma is classified as a salivary gland malignancy. Parotid gland carcinoma (PGC) is a relatively rare malignancy, accounting for approximately 3% of head and neck cancers (Kim et al., 2023). The incidence of parotid malignancies has increased over the past few decades. For example, the age-adjusted incidence of parotid gland malignancies in the United States increased by 58.1% from 1973 to 2015 (Gupta et al., 2020).

There are several types of parotid gland carcinoma, namely mucoepidermoid carcinoma and acinic cell carcinoma (Saravakos et al., 2022).

The treatment modality for parotid gland malignancies is surgical intervention. The goal is to achieve clear surgical margins while preserving facial nerve function whenever possible (Deschler & Eisele, 2016)

Head and neck reconstruction surgery presents many challenges due to the complexity of the anatomical structure, the importance of the functional area, and the frequent need for adjuvant post-operative care. Anatomical and functional complexity are special considerations for surgery in the head and neck region. The head and neck region contains many highly complex critical structures such as nerves, blood vessels, and various types of tissue (mucosa, bone, skin) (Goodson et al., 2023). This complexity makes surgery and reconstruction very challenging (Perrault & Bruckman, 2021).

In terms of surgical function, this field can affect important functions such as breathing, speaking, swallowing, and sensory perception, requiring careful planning to restore form and function. (Ray, 2018) Complications such as bleeding, dysphagia, nerve injury, and wound healing problems such as dehiscence and fistula formation also need to be considered as they can significantly affect the final outcome and quality of life of patients (Bresler & Park, 2021).

Factors such as diabetes, smoking, and previous radiation therapy increase the likelihood of complications (Valentini et al., 2008). Proper management of perioperative variables, such as fluid administration and nutritional support, is essential to minimize complications (Vincent et al., 2019).

Free flaps are currently the method of choice for achieving optimal results, but they carry risks of flap loss, infection, and donor site morbidity. (Chang et al., 2016)

Technological considerations, 3D planning, and the role of digital technology have improved precision and outcomes, but require significant expertise and resources (Mohamedbhai et al., 2022).

The need for adjuvant treatment after surgery, such as radiation therapy, can complicate the healing process and affect the timing and approach to reconstruction (Stack et al., 2023).

Meanwhile, effective rehabilitation is essential to improve quality of life and address functional and aesthetic outcomes (Breik et al., 2020).

When selecting a flap for reconstruction in the head and neck area, several important factors must be considered in order to achieve optimal results:

**1. Defect composition and location**

• Size and complexity of the defect. The size and complexity of the defect significantly influence flap selection. For large, composite defects involving bone, mucosa, soft tissue, and skin, microvascular free flaps are often preferred due to their flexibility and ability to provide comprehensive reconstruction. (Hayden & Nagel, 2013)

Specific anatomical requirements. Different flaps are suitable for specific anatomical locations. For example, enteric flaps such as the gastro-mental flap and free jejunal flap are ideal for reconstructing defects in the oral cavity, oropharynx, and hypopharynx due to their flexibility and ability to conceal mucus. (Lorenz & Alam, 2003)

**2. Functional and Aesthetic Outcomes**

• Functional Restoration. Achieving functional outcomes such as speech, swallowing, and mystification is very important. Free surgical flaps, such as radial arm flaps, are often used for their reliability in restoring function (Szwedowicz et al., 2011).

• Aesthetic Considerations.

Aesthetic outcomes, including color matching and contouring, are also important. Flaps such as the medial sural artery perforator and lateral arm flap provide better color matching for facial reconstruction (Dermody et al., 2024). Direct restoration of facial contours using adipofascial perforator flaps can significantly improve self-image and quality of life (Hanasono et al., 2011).

**3. Donor site morbidity.**

The choice of flap also depends on the potential morbidity at the donor site. For example, submental flaps are preferred for minimal donor site damage and cosmetically hidden scars. (Danishchuk et al., 2023)

**4. Patient-Specific Factors.**

- Patient age and comorbidities play an important role in flap selection. Older patients can successfully undergo free flap transfer if carefully selected based on their overall health and comorbidities. (Ferrari et al., 2013)
- The surgeon's expertise and patient preferences also influence flap selection. Surgeons must be skilled at assessing defects and planning reconstruction in order to select the most appropriate flap from the available options (Hofer & Mureau, 2010).

**5. Technical Considerations.**

- Preoperative mapping of perforators, especially for flaps such as the anterolateral thigh (ALT) flap, is essential to ensure successful outcomes and reduce operative time (Chen et al., 2010).
- Flap design and harvesting, such as using a single-pedicle or double-pedicle

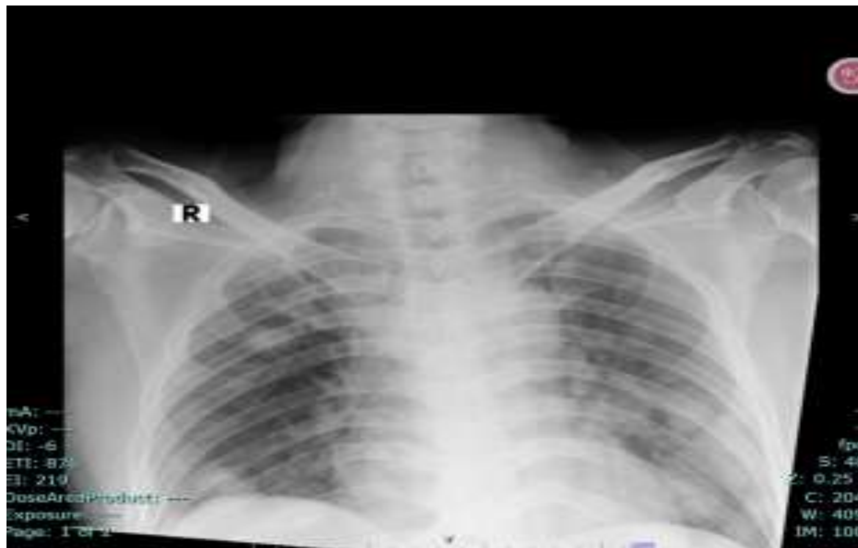
approach for thigh flaps, can influence the success rate and complications of reconstruction (King et al., 2018)

## CASE REPORT

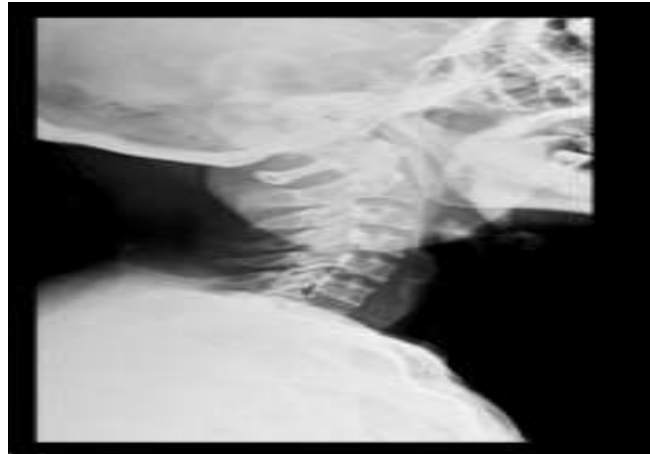
A 62-year-old man came to the emergency unit of Dr. Soetomo General Hospital complaining of a lump on his right cheek that had appeared a year ago. Initially, the lump was the size of a fish eye, but gradually grew larger. The lump grew rapidly over the last two months. Currently, the lump is the size of an adult's fist. The patient had previously undergone a biopsy at another hospital, and the results were reported to be malignant.

Previous history of hypertension and diabetes mellitus denied.

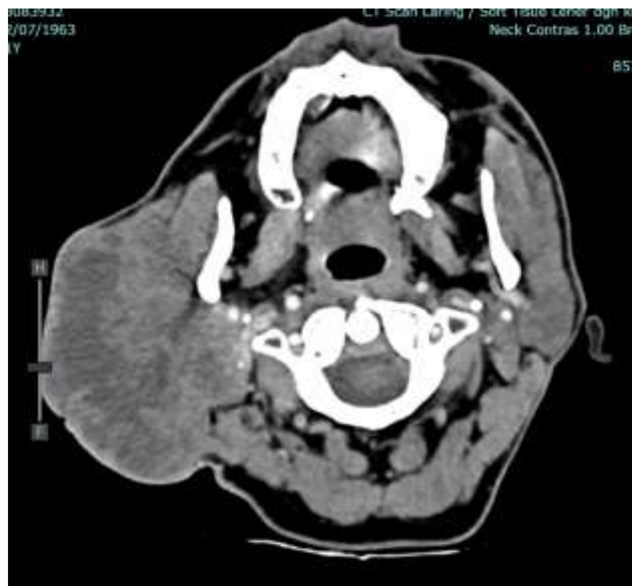
On extraoral clinical examination, significant facial asymmetry was noted without facial nerve paralysis. On contrast-enhanced CT scan of the head, a malignant mass was found in the right parotid gland extending from the infraauricular region to VC 4, measuring approximately 9.5 x 6.9 x 8.2 cm. On lateral cervical radiography, no metastatic process was observed in the cervical bones. An opacity with a mass density measuring approximately 11.4 x 11.9 cm, projected at the level of VC 1-4, may be a parotid mass. Thoracic X-ray examination revealed multiple nodules in the right and left lungs, the largest measuring approximately 2.7 x 2.4 cm in the right paracardial region, which may be a metastatic process.




Chest X-ray



Cervical photo




Head CT Scan Contarst

Laboratory Examination: Hemoglobin (Hb) level 12.2 g/dL, hematocrit (Ht) 34.9%, and white blood cell (WBC) count 11.58 x 103 with neutrophils (NET) 78.5%, lymphocytes (LYM) 9.5%, monocytes (MON) 7.9%, eosinophils (EOS) 0.42%, and basophils 0.5%. Platelet count (PLT) 326,000. Serum albumin level was 2.99 g/dL. Potassium level was 3.20 mEq/L, sodium level was 124 mEq/L, and chloride level was 83 mEq/L. Random glucose level (GDA) was 371 mg/dL. HbA1c was 12.5%.

The patient was diagnosed with right parotid carcinoma suspected to be adenoid cystic carcinoma T4aN1M1 (lung). The patient was scheduled for right radical parotidectomy, type 3 mRND neck dissection, and defect closure with a pectoralis major myocutaneous flap (PMMC). The reason for using PMMC is the large defect caused by the removal of the tumor in the right parotid gland. Microanastomosis (free flap) is not necessary, and the procedure is quick and relatively easy to perform. Stable blood supply from the thoracoacromial artery. Suitable for hospitals with limited resources.

After the right parotid tumor was removed, an examination was performed to determine whether the incision margins were tumor-free. Once declared tumor-free, the defect was closed with a PMMC flap. Pectoralis Major Myocutaneous Flap (PMMC) surgical technique.

1. The patient is in the supine position.

2. A flap design is created according to the size of the defect. Usually, this is the skin above the upper chest muscle.

3. The flap is lifted along with the pectoralis major muscle, where the blood supply comes from the thoracoacromial artery.

4. The flap is rotated to the neck/head through a subcutaneous “tunnel” or under the right clavicle.

5. The flap is then sutured to the defect site.

6. The donor site on the chest is then closed.

Observation for 1 day revealed a necrotic flap, and a “salvage operation” was planned after the initial operation failed. During the operation, necrosis was found on the PMMC flap, venous congestion, and a defect with a muscular base in the right neck region to the inferior auricle measuring 10x8x8 cm. The defect was closed with a Latissimus dorsi flap.

The advantages of the latissimus dorsi flap are:

1. Large and long muscle. So it can cover a large defect.

2. Strong and consistent blood supply.

3. Can be used as a free flap or pedicled flap.

4. Suitable for patients with a history of radiation to the recipient site.

The technique for the latissimus dorsi flap is as follows:

1. Position the patient in the left lateral decubitus position.

2. Mark the donor and recipient areas.

3. Make an incision along the line of the latissimus dorsi muscle fibers, forming an oval or ellipse, including the skin component if using a myocutaneous flap.

4. Identify and detach the latissimus dorsi muscle from the thoracolumbar fascia.

5. Preserve the main vascular pedicle from the thoracodorsal artery and accompanying vein.

6. Elevate the flap from its origin at the spine and pelvis.

7. The pedicle is preserved and not cut.

8. Rotate or transpose the flap to the defect site if the defect is in the right parotid area

9. Suture the flap in its new location, adjusting its shape and volume.

10. Close the donor site with primary closure or a skin graft

11. Place a drain to prevent seroma.

## DISCUSSION

According to the literature, the management of this case, namely the surgical treatment of parotid carcinoma, requires an approach tailored to the characteristics of the tumor and the patient's condition. Total parotidectomy and preservation or sacrifice of the facial nerve, as well as adjuvant therapies such as radiotherapy and chemotherapy, are important components in the management of parotid carcinoma. The flap remained viable after surgery. At the one-month follow-up, the patient had no complaints and the flap remained viable. The patient is scheduled to undergo radiotherapy as a follow-up treatment.

Advantages of LD Flap as a salvage option compared to PMMC or free flap

• Versatility and Flexibility: LD flap has high flexibility in soft tissue design and greater rotation length compared to PMMC, which is very important in complex reconstruction cases. (Ong et al., 2014)

• Tissue Volume: The LD flap can provide substantial tissue volume, especially when harvested with the surrounding fat zone, and can be enhanced with the use of implants or lipomodelling. (Down & Pereira, 2021)

• Donor Site Morbidity: Although there is morbidity at the donor site, such as pain and shoulder weakness, proper technique can minimize these complications. (Ismaïl et al., 2014)

Vascular Reliability: LD flaps have predictable vascular anatomy with large-caliber blood vessels that are rarely affected by atherosclerosis. (Hölzle & Bock, 2023)

• Adaptability: The LD flap can be used in various forms, such as musculocutaneous, pure muscle, and pure skin flaps, depending on the needs of the recipient site. (Tan et al., 2007)

Disadvantages of LD Flap:

• Donor Site Morbidity: Morbidity at the donor site includes pain, shoulder weakness, and persistent seroma formation. (Doan et al., 2024)

• Body Position During Surgery: LD flap surgery requires changes in the patient's body position, which can be challenging during the surgical procedure. (Endo et al., 2010)

• Donor Site Aesthetics: Asymmetrical scars on the back and the need for prostheses are common complaints. (Doan et al., 2024)

Advantages of PMMC:

• Harvesting Ease: PMMC flaps are easy to harvest with relatively short operating times. (Endo et al., 2010)

• Flap Viability: The PMMC flap has good flap viability and provides abundant soft tissue for various reconstruction options. (Endo et al., 2010)

• Minimal Functional Impairment: The PMMC flap causes minimal functional impairment and can be used

in the supine position. (Hallock, 2013)

Disadvantages of PMMC:

• Pedicle Length: The pedicle of the PMMC flap is relatively short, which may require a vein graft to reach the recipient site. (Hallock, 2013)

• Rotation Limitations: The PMMC flap has limitations in rotation compared to the LD flap. (Ong et al., 2014)

Advantages of Free Flap:

• Aesthetics and Function: Free flaps such as anterolateral thigh flaps have better aesthetic results and lower complications compared to LD flaps. (Tekfiliz et al., 2024)

• Adaptability: Free flaps can be adapted to various shapes and sizes of defects, providing high flexibility. (Zhu et al., 2023)

Disadvantages of Free Flap:

• Surgical Complexity: Free flaps require complex microvascular techniques and longer operating times. (Zhu et al., 2023)

• Patient Limitations: Not all patients are suitable for free flaps, especially those with high BMI or who have undergone previous abdominal surgery. (Down & Pereira, 2021)

According to the latest literature, the latissimus dorsi muscle, with its long vascular pedicle, can be converted into a sufficiently long flap which, together with its large muscle volume and reliable vascular supply, makes this muscle ideal for large head and neck reconstruction. In addition, the length and diameter of the main vascular supply allow for the creation of an excellent free flap. The latissimus dorsi muscle has proven highly useful in covering defects on the cheek and lateral scalp.

Although most of the neck can be covered by the latissimus dorsi muscle, the pectoralis major muscle is generally preferred for neck and intraoral reconstruction. The latissimus dorsi muscle is used in this area when large volumes, skin, or both are required. (Hoffman WY et al., n.d.). 100% survival rate in several studies. (Kojima et al., 2024)

Lessons learned from salvage surgery in head and neck surgery are that salvage procedures are complex and challenging, often considered a last resort after failure of initial treatments such as chemoradiotherapy.

Here are some important lessons from experience with salvage surgery in this context:

Challenges and complications

• Radiation effects. Previous radiation therapy significantly complicates reconstructive efforts due to its adverse effects on tissue, leading to an increased risk of wound healing complications and surgical failure (Kwon et al., 2018).

• High morbidity. Salvage surgery is associated with high morbidity, including complications such as fistula, infection, and flap failure. These complications necessitate careful surgical planning and postoperative care. (Cîrstea et al., 2024)

• Patient selection. Identifying suitable candidates for salvage surgery is crucial. Factors such as age, early tumor stage, time to recurrence, and regional recurrence significantly impact survival outcomes. (Hartl et al., 2023)

Reconstructive Techniques

• Flap Selection. The use of pedicled and microvascular free flaps, such as the large pectoralis island flap and the anterolateral thigh (ALT) flap, is essential for reconstructing defects and preserving function. These flaps help transfer vital tissue to irradiated areas, reducing complications and improving outcomes. (Cîrstea et al., 2024)

• Emerging Technologies. Advances in surgical techniques, including transoral robotic surgery (TORS), computer-aided design, and virtual surgery, have shown promise in improving the precision and outcomes of salvage surgery. (Goel et al., 2025)

Multidisciplinary Approach

• Team collaboration. Successful rescue operations require a multidisciplinary team approach, involving otorhinolaryngologists, plastic surgeons, maxillofacial surgeons, oncologists, and radiologists. This collaboration ensures comprehensive care and better management of complex cases. (Cîrstea et al., 2024)

• Shared decision-making. Involving patients in the shared decision-making process is crucial, given the high risks and potential impact on quality of life. This approach helps tailor care to individual patient needs and preferences. (Dolivet et al., 2011)

Outcomes and Prognosis

• Survival rates. While salvage surgery can improve local control and survival rates, outcomes are often uncertain. Factors such as surgical margins, extracapsular extension, and perineural invasion are important predictors of prognosis. (Hartl et al., 2023)

• Quality of life. Postoperative rehabilitation, including speech and swallowing therapy, is crucial for improving quality of life in patients undergoing salvage surgery. Long-term follow-up and support are necessary to address functional impairments. (Mastronicola et al., 2023)

## CONCLUSION

Surgery for head and neck cancer is fraught with

challenges but remains an important option for recurrent cases. Lessons learned emphasize the importance of careful patient selection, advanced reconstruction techniques, multidisciplinary collaboration, and continuous innovation to optimize outcomes and improve patient quality of life.

**ACKNOWLEDGMENTS**

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Author Contributions

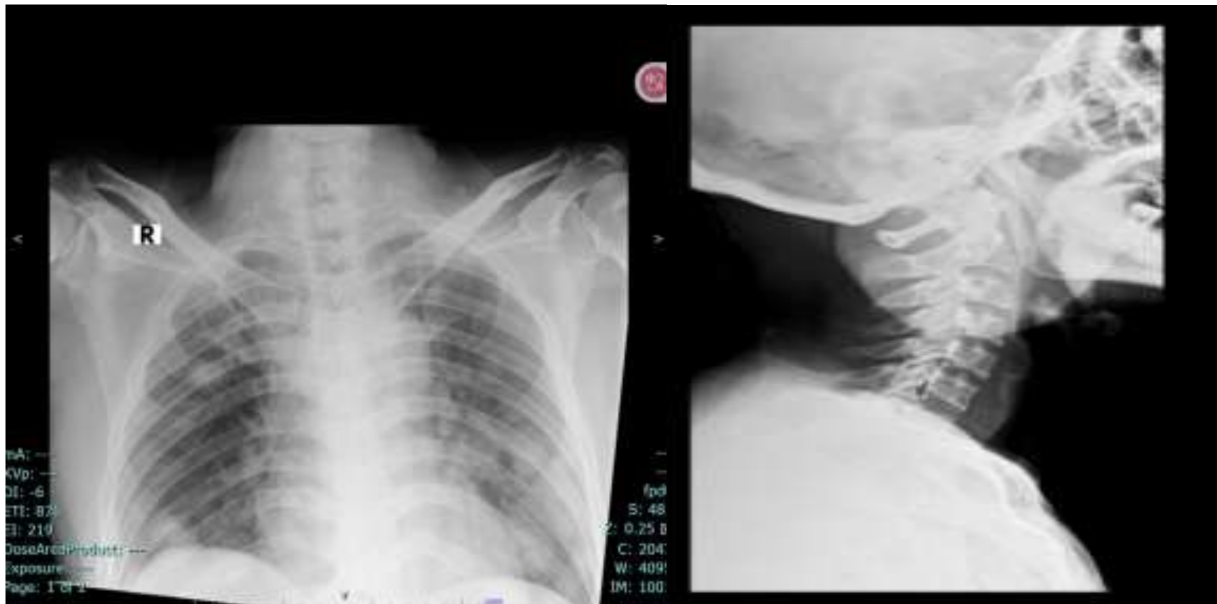
Each author mentioned has made significant, direct, and intellectual contributions to the work and has given their approval for the manuscript to be published in its final form.

Conflict of Interest

The authors declare that there are no conflicts of interest in this research.

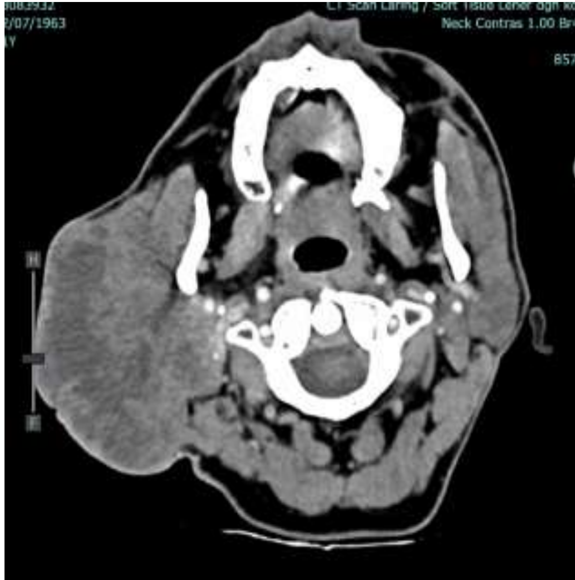
Ethical Statement

Informed consent has been obtained from the patients...




Chest X - ray

Photo Cervical



Head CT scan with contrast

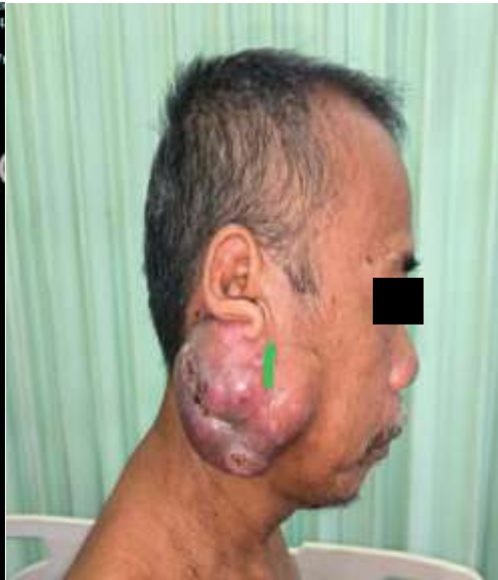


Figure 1. depicts a mass in the right parotid gland measuring 9.5 x 6.9 x 8.2 cm. Fixed to the skin. 9.5 x 6.9 x 8.2

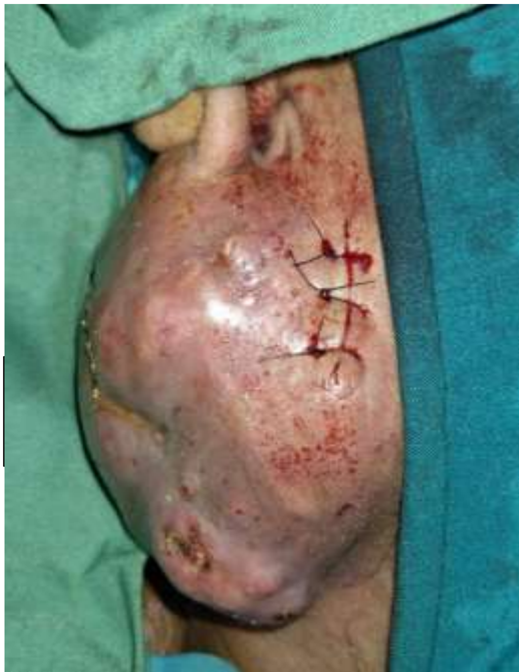


Figure 2. The patient underwent a biopsy.

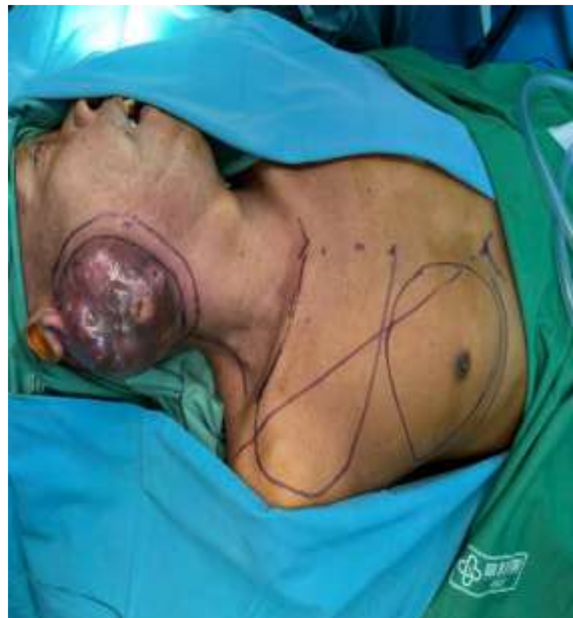


Figure 3. Patient in supine position with an image of the Pectoralis Major Myocutaneous Flap design on the chest wall.

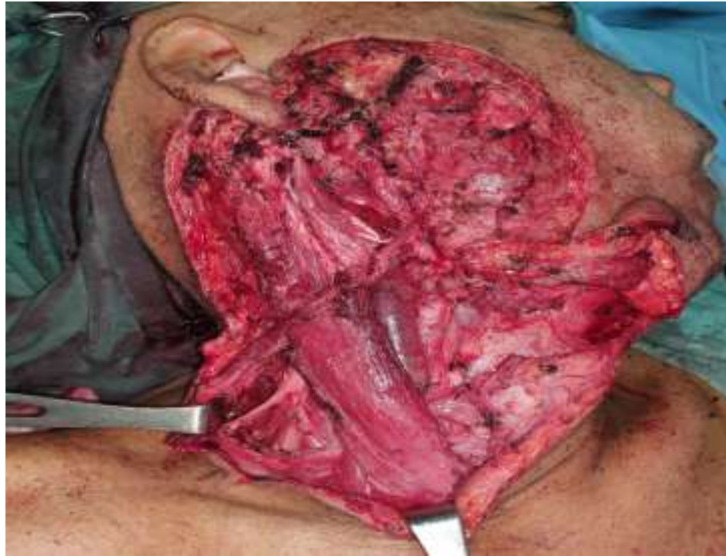


Figure 4. Shows that the mass in the right parotid gland has been removed.

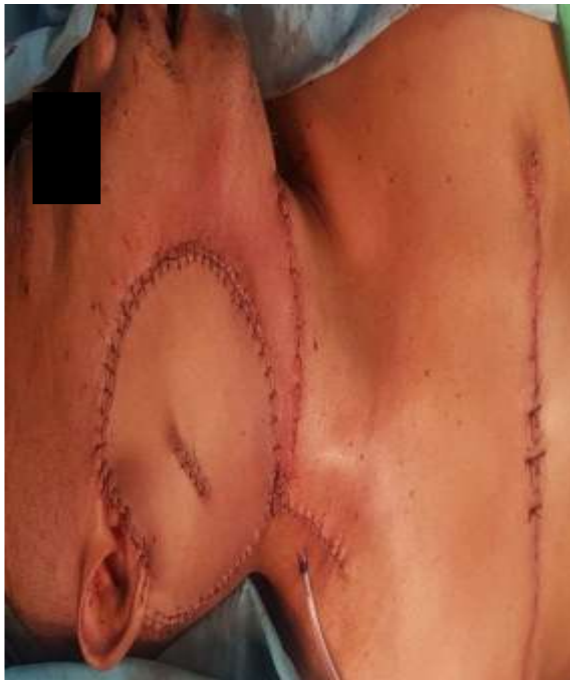


Figure 5. Defect covered with Pectoralis Major Myocutaneous Flap

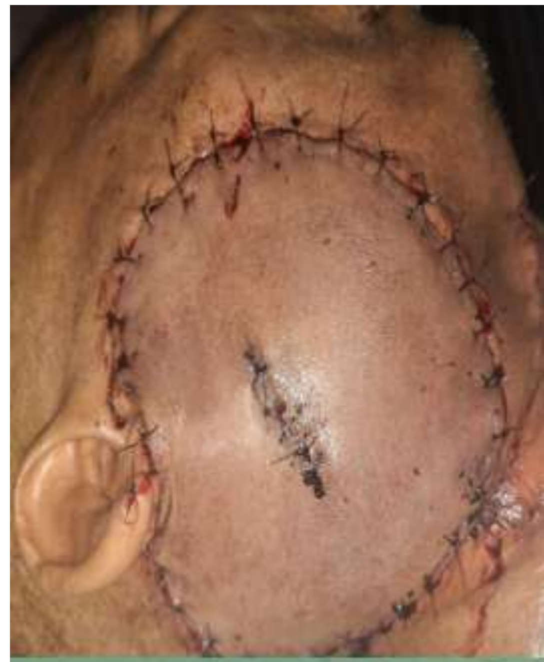


Figure 6. During 24-hour observation, the flap began to darken.

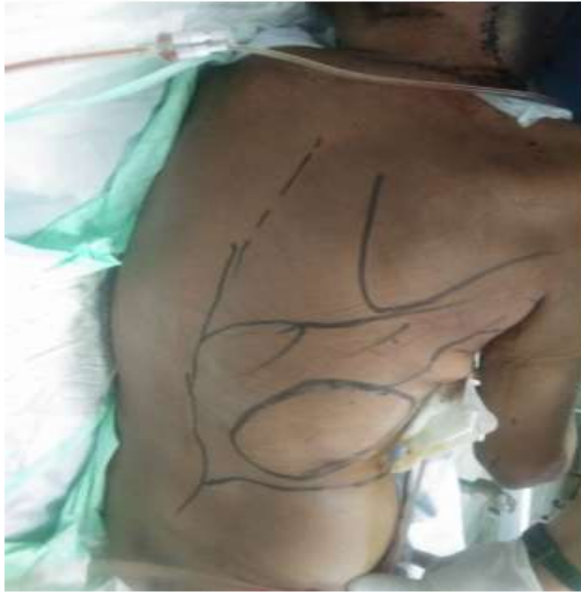


Figure 7. Salvage option with latissimus dorsi flap in a patient positioned on their left side

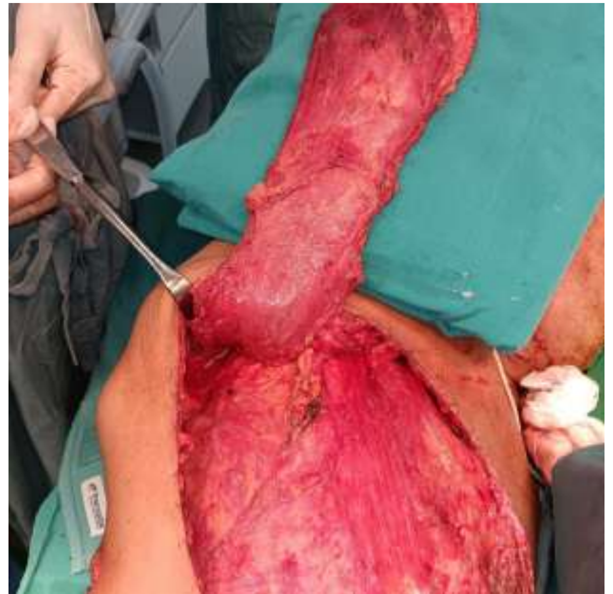


Figure 8. The latissimus dorsi muscle is detached from its base and then lifted upward.

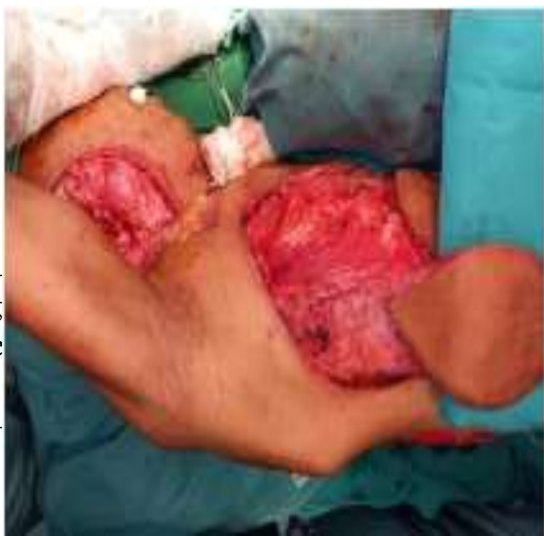


Figure 9. Tunneling created through the right clavicle

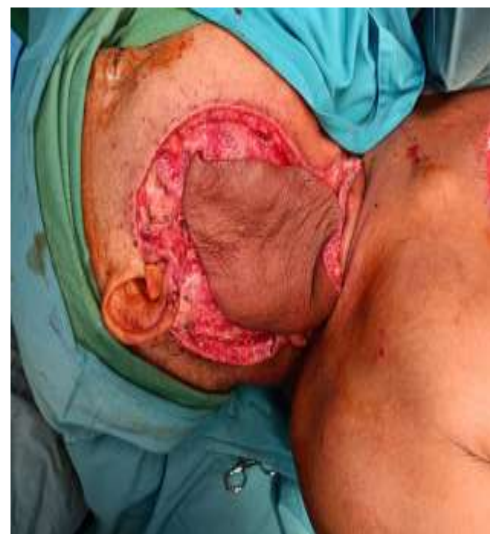


Figure 10. The latissimus dorsi flap is pulled through a tunnel under the right clavicle toward the defect in the right parotid gland.

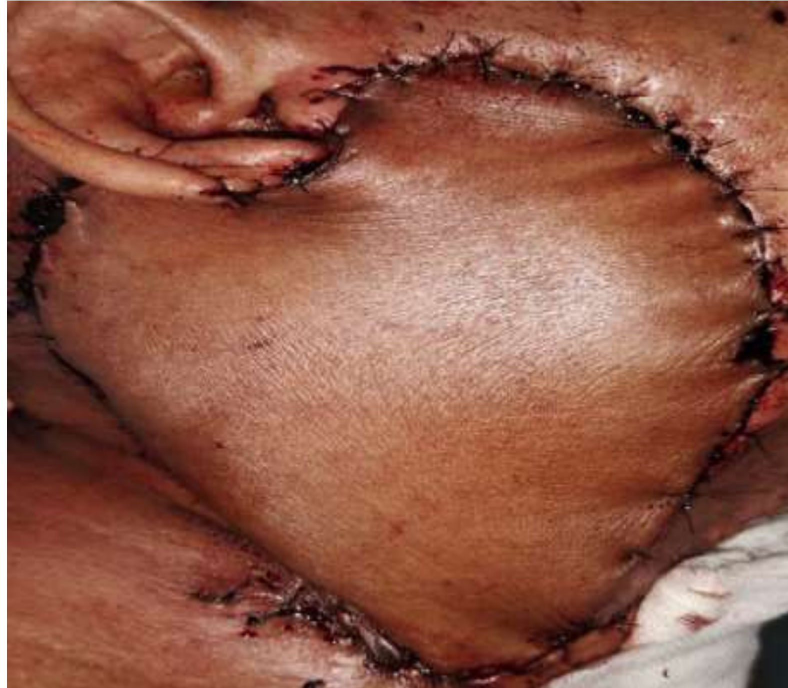


Figure 11. Flap sutured to close the surgical defect

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