

COMPLEX ABDOMINAL WALL RECONSTRUCTION USING MESH AND FREE FLAP: A RARE CASE REPORT & LITERATURE REVIEW

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COMPLEX ABDOMINAL WALL RECONSTRUCTION USING MESH AND FREE FLAP: A RARE CASE REPORT & LITERATURE REVIEW

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ABSTRACT

Introduction: Managing complex defects of the abdominal wall has been a challenge for general and reconstructive surgeons since the year 2000. Fewer studies have been carried out on anterior abdominal wall reconstruction following excision of peripheral primitive neuroectodermal tumor, and there is currently a dearth of information in a systematic review.

Materials and methods: A 26-year-old female of African descent was received in one the largest faith based hospital on Kenya with a four-year history of anterior abdominal wall swelling. She underwent wide local excision and reconstruction of the defect using a mesh and ALT fasciocutaneous free flap

Results: The patient responded positively to the surgical intervention and tolerated well the surgical procedures. 100% of the flap survived and had the post excision margins were all free of tumor.

Conclusion: Abdominal wall reconstruction is a complex surgical procedure aimed at restoring the structural integrity and functional capacity of the abdominal wall following trauma, surgery, or disease. The use of free ALT fasciocutaneous flap as well as mesh in abdominal wall reconstruction provides durable reinforcement and reducing the risk of hernia recurrence.

Keywords: Abdominal wall, primitive neuroectodermal tumor, histology, free flap

INTRODUCTION

Since the turn of the century, managing complicated defects of the abdominal wall has presented a challenge to both general and reconstructive surgeons. Plastic surgeons' expertise has been utilized in the development of techniques for manipulating and mobilizing muscle and myocutaneous flaps due to the complexity of abdominal wall defects, which was previously the domain of general surgeons(1). Reconstructive surgeons aim to provide stable and long-lasting wound coverage while restoring the structural and functional continuity of the musculofascial system in the management of complex abdominal wall defects, regardless of their training.

The authors present a case of a complex anterior abdominal wall reconstruction following excision of peripheral primitive neuroectodermal tumor in a young otherwise healthy African woman of Congolese descent, without obvious risk factors. This is one of a series of infrequent articles highlighting conditions that may be more widespread than many doctors realize or that may go unnoticed at first. The series advisers are Dr. Adegu William Jacob, Department of Plastics Reconstructive & aesthetic surgery in the University of Nairobi; Prof. Stanley Ominde Khainga, Chairman Kenya Medical practitioners & Dentists Council (KMPDC), Dr. Benjamin Wasiche Wabwire, Chairman department of Plastic Surgery, Kenyatta

National Hospital (K.N.H) and Prof. Ferdinand Wanjala Nang'ole (PhD), Chairman Department of Plastics Reconstructive & Aesthetic Surgery, University of Nairobi (UoN). To suggest a topic for this series, please email the corresponding author at jacobadegu@yahoo.com

MATERIALS AND METHODS

A 26-year-old female of African descent was received in one the largest faith based hospital on Kenya with a four-year history of anterior abdominal wall swelling. She reported that the mass had been slowly increasing in size over the years, but had lately become ulcerated and shortly started bleeding as well as exhibiting purulent discharge. She intimated that the bleeding had started 6 months earlier, and it was initially mild and could stop with application of pressure, but had recently increased and was associated with dizziness. There was no associated fevers or pain. She also affirmed that the mass had initially been debulked 2 years ago and she was under treatment for non-Hodgkin's lymphoma. Other history was unremarkable.

On general examination, she was cachexic, wasted and malnourished. She was tachypnea, with a heart rate of 139 beats per minute, she had a fever of 38.9 degrees Celsius, respiratory rate of 19 and a blood pressure of 96/58. She had mild parlor, grade 3 finger clubbing as well as generalized lymphadenopathy (this included both groin axillary lymph nodes). On physical examination, there was a large fungating mass located on the anterior lower abdominal wall, measuring about 12cm by 15 cms. The mass was ulcerative and bleeding on light touch. It also had a malodor. There was another chronic wound on the left lateral abdominal wall, that was due to previous debulking and radiotherapy. This had been excised 2 years prior to her presentation at the facility. The wound bed had necrotic tissues and the edges were contracting.

The patient was taken to theatre for wide local excision with a margin of 4cm and wound cover.

The tumor was excised en-mass by the general surgery team. The tumor had infiltrated on the rectus sheath, and thus had to be removed. After removal of the tumor, Polypropylene synthetic mesh measuring 15 cm by 20 cm was used to reinforce the rectus via sublay technique. ALT fasciocutaneous flap was designed along an axis between the ASIS and lateral border of the patella. The flap was centered at the junction between the upper third and lower two thirds, and harvested by the plastic surgery team from the left thigh. The size of the flap was 15cm by 20 cm. This

was raised as a free flap with the pedicle being the descending branch of the lateral femoral circumflex artery with its commitantes. The recipient vessel was the inferior epigastric vessels. The flap was held in situ in layers using vicryl 2.0 and skin sutured using staples. No pressure was allowed on the recipient site. Donor site was closed primarily.

Both wounds were dressed using bactigrass and opsite dressings. The change of dressing was done on day 3 post op. The WLE specimen was availed for histological analysis.

RESULTS

She tolerated well the procedure. The flap was monitored 2hrly for the first 24 hours for temperature, color and turgidity. Wound dressing change was done every 3 days. She was also put on empiric antibiotic therapy.

The flap take was 100%. The patient remained stable throughout the procedure as well as post operatively. This patient was being handled using a multidisciplinary approach. Both general surgeons and plastic surgeons were all onboard. The histology biopsy which was taken after the WLE demonstrated primitive neuroectodermal tumor with negative margins.



Figure 1 showing the large fungating anterior abdominal wall mass, with a previous chronic wound that was due to debulking 2 years ago.



Figure 2 showing the defect created after WLE of the tumor with 4 cms margin. The peritoneum has been breached at the midline.



Figure 3 showing laying of the ALT fasciocutaneous flap on the mesh with the aim of closing the anterior abdominal wall defect.



Figure 4: Picture showing the final closed defect and primary closure of the donor site. Drain left in situ.

DISCUSSION

The principles of abdominal wall reconstruction include restoration of normal anatomy, tension free repair, primary closure of fascial defects, mesh reinforcement, biological consideration as well as a multidisciplinary approach.

While reconstructing the abdominal wall, a careful analysis of the defect needs to be done. This will have a bearing on which options to use. Careful preoperative planning, accurate flap design, and precise surgical technique are necessary for the successful reconstruction of abdominal wall defects using the ALT free flap. The vascular pedicle for the ALT flap is the perforators of the descending branch of the lateral circumflex femoral artery (LCFA), which can be accurately identified with preoperative imaging studies like computed tomography angiography (CTA) or Doppler ultrasonography(12,13) it is necessary to use reconstructive surgery techniques. The authors present an original case of reconstruction of the abdominal wall, using an anterolateral thigh flap (ALT). Careful dissection and preservation of the pedicle and perforators during the surgical procedure are necessary to guarantee flap viability and reduce the possibility of vascular compromise. Depending on the needs of the reconstruction, the ALT flap can

be harvested as a musculocutaneous, adipocutaneous, or fasciocutaneous flap. Close observation of flap perfusion, wound healing, and donor site morbidity is required postoperatively in order to detect and promptly manage any possible complications. The ALT free flap provides a dependable and adaptable option for the reconstruction of abdominal wall defects, improving functional outcomes and improving patients' quality of life with careful patient selection and precise surgical technique(10,14).

CONCLUSION

The etiology of pPNETs remains poorly understood, but genetic alterations involving chromosomal translocations or gene fusions have been implicated in their pathogenesis.

Abdominal wall reconstruction (AWR) is a complex surgical procedure aimed at restoring the structural integrity and functional capacity of the abdominal wall following trauma, surgery, or disease.

The use of synthetic meshes in AWR has revolutionized the management of abdominal wall defects, providing durable reinforcement and reducing the risk of hernia recurrence. Synthetic meshes are typically composed of non-biological materials such as polypropylene, polyester, or polytetrafluoroethylene (PTFE), which offer high tensile strength, flexibility, and biocompatibility. These meshes can be placed in various configurations, including on lay, inlay, or underlay techniques, depending on the location and characteristics of the defect. Synthetic meshes promote tissue ingrowth and remodeling, ultimately incorporating into the abdominal wall and providing long-term support. However, the use of synthetic meshes may be associated with complications such as infection, seroma formation, mesh migration, or adhesion formation. Surgeons must carefully weigh the benefits and risks of mesh placement in each patient and consider alternative reconstruction techniques in cases of contamination, infection, or complex abdominal wall anatomy. Ongoing research efforts aim to refine mesh materials, design, and surgical techniques to further improve outcomes and reduce complications in AWR.

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