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Case Report

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Repair of Large Lateral Abdominal Wall Defect Post Resection of Abdominal Wall Sarcoma: A Paradigm

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Introduction

A 52-year- old healthy female presented with a large abdominal mass requiring further evaluation and management.

Case Presentation

A 52-year-old female presented with a large lateral abdominal mass, which gradually progressed over the last two years. Examination revealed an abdominal wall mass of the right lumbar area. Imaging studies including computed tomography (CT) and magnetic resonance image(MRI) confirmed the presence of a large tumor of the lateral abdominal wall measuring 9.8x8x7cm. Biopsy confirmed it to be a Grade 2 leiomyosarcoma. After staging the patient underwent primary resection of the tumor with a wide margin leaving behind a large abdominal wall defect.

Although many surgical techniques were used in the past to reconstruct the abdominal wall (myocutaneous flaps, prosthetic mesh, and biological mesh) here we describe an approach using the rectus muscle while sparing the anterior rectus sheath combined with component separation of the abdominal wall. This approach reinforces the defect not only with a non-absorbable synthetic mesh (pillar anchored repair) but also with an autologous tissue to provide better dynamic repair and integrity to the abdominal wall. This technique can be considered to be a part of our armamentarium of complex lateral abdominal wall reconstruction.

Conclusion

Large lateral abdominal wall defects pose a challenging situation to maintain the integrity of the abdominal wall. Here we highlight a comprehensive approach for reconstruction of the lateral abdominal wall combined with other modern techniques to prevent future complications and thus provide better patient outcomes.

Case Description

Abdominal wall reconstruction following resection of large abdominal sarcomas continues to remain a challenging problem [1]. There is no ideal surgical option for the reconstruction of a large lateral abdominal wall defect. Appropriate reconstruction is imperative to provide functional and structural stability [2]. Optimal closure is of paramount importance to prevent bowel or other internal organ herniations and also to prevent future incisional hernias, recurrent hernias, mesh infection, wound infection, seromas, and other complications [3].

Here the authors present a case of a 52-year-old female who presented with complaints of a large right-sided lateral abdominal swelling, insidious in onset, gradually progressive over the last two years. In addition, she gave no other symptoms and had no known comorbidities with no significant past medical or surgical history. Examination unveiled a large swelling of the right half of the abdomen with tense overlying skin. On further evaluation, computed tomography (CT) (Fig 1.) and magnetic resonance imaging (MRI) scans of the abdomen revealed a large abdominal wall tumor measuring 9.8x8x7cm and biopsy confirmed a Grade 2 Leiomyosarcoma(Fig 2.). Staging revealed no distant metastasis.

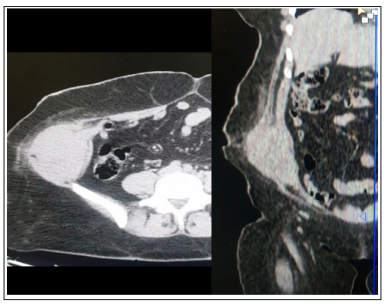

Figure 1: Computed tomography showing the large Lateral Abdominal wall sarcoma

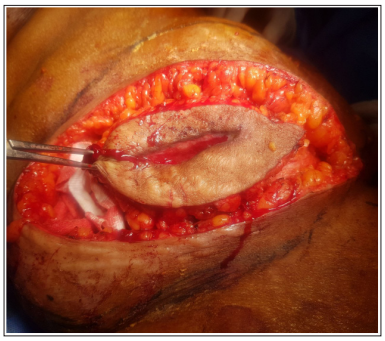

Figure 2: Lateral Abdominal wall sarcoma with prior biopsy

Primary resection of the tumor with a wide gross margin of 5cm was performed (Fig 3.). A large lateral abdominal wall defect measuring 20X15X10 cm was left which required reconstruction. As these lateral defects are subjected to asymmetric forces resulting in weakness or hernia, static reconstruction was performed. The peritoneum was preserved near the posterior sheath. An absorbable vicryl mesh was used to compartmentalize the intraabdominal contents (Fig 4.). This was sutured to the remaining peritoneum. Component separation was performed of the remaining lateral abdominal wall muscles.

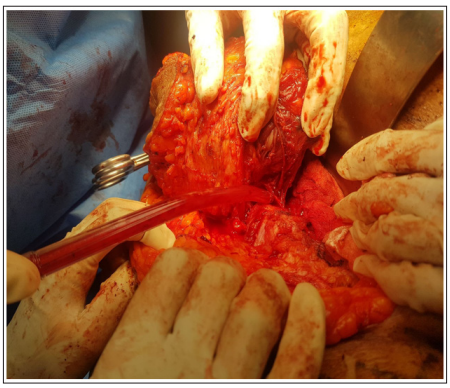

Figure 3: Resection of Abdominal wall sarcoma of the iliac bone

Figure 4: Vicryl mesh used to compartmentalize intraabdominal contents

This created a wider space to anchor the mesh to the static pillars; Mobilization was performed till the costal margin superiorly and the inguinal ligament and the iliac crest inferiorly. Medially to the linea alba and posteriorly to the iliopsoas in the retroperitoneum. Sutures were used for the costal and ligamentous fixation and tackers for bony fixation. Non-absorbable synthetic mesh(polypropylene) was anchored to the static pillars as described above. However, there was still a large defect as the muscle could not be approximated despite extensive mobilization(Fig 5.). As we had adequate skin and soft tissue we decided to use only rectus muscle for coverage. The rectus muscle on the same side was mobilized (leaving the anterior sheath intact)from its superior attachment maintaining its blood supply (deep inferior epigastric artery) and this was rotated and sutured to the edges of the defect thereby completely covering the mesh and anchoring to the remaining lateral abdominal wall defect (Fig 6.). This created a well-vascularized pedicle and a static pillar anchored repair leading to a dynamic abdominal wall reconstruction. The skin and soft tissue were mobilized and were primarily approximated. Two drains were left in the layers of the abdominal wall (Fig 7.).

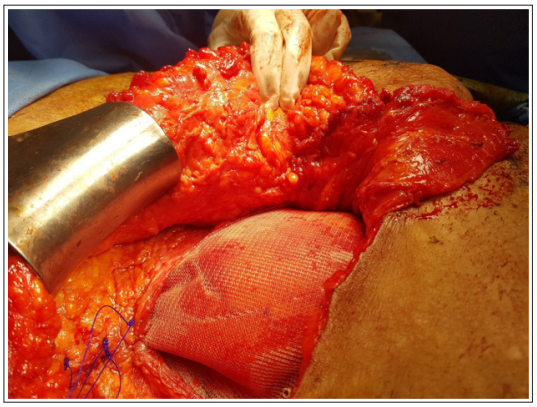

Figure 5: Component Separation with primary closure with remaining defect with prolene mesh

Figure 6: Mobilized Rectus abdominis muscle over the prolene mesh

Figure 7: Primary Closure of skin and subcutaneous tissue with two drains

Postoperative recovery was uneventful and the patient was discharged on the fifth postoperative day. The patient was followed up for three months with good integrity of the abdominal wall with no evidence of any wound infections, seromas, or immediate hernias.

Discussion

Soft tissue sarcoma is a rare malignancy accounting for about less than 1 % of all adult tumors arising from the mesoderm or mesenchymal stem cells. Leiomyosarcoma (LMS), a common subtype, encompasses about 25 percent of all sarcomas. The etiology is unknown, but a history of prior radiotherapy has been shown to increase the propensity for LMS. These occur mainly in the abdomen, blood vessels, retroperitoneum, and uterus with the least occurrence in the extremities. As in our case, most of the LMS present as a mass, displacing or compressing the adjacent organs [4]. Location of the tumor is one of the important prognostic factors. Abdominal and retroperitoneal sarcomas have shown poor prognosis compared to the sarcomas in the extremities. A biopsy of the mass is needed to confirm the diagnosis. It is important to rule out metastasis to the lungs, liver, and other organs due to its hematogenous spread [4,5]

Surgical management is an extremely challenging entity as it entirely depends on the location of the tumor. It is vital to consider various other factors whilst deciding the suitable surgical technique including the size of the defect, the area involved, prior surgeries, the experience of the surgeon, and presence or absence of infection [6]. A large sarcoma occupying the lateral abdominal wall is even more challenging than the anterior abdominal wall. In our case, the tumor occupied the lateral abdominal wall [7]. Resection of this tumor will lead to a large lateral abdominal wall defect and an adynamic abdomen.

Defects of the lateral abdominal wall are more divergent than the anterior abdominal wall. It is here that the anatomic forces are asymmetric with a higher muscle to fascia ratio. Improper reconstruction of these defects leads to further weakening and loss of abdominal wall contour, leading to hernia and further surgeries [7].

The principles of repair of lateral abdominal wall defects involve either bridging the defect with nonabsorbable mesh or wide dissection and anchoring the mesh to the static pillars of the lateral abdomen. Dynamic reconstruction of the abdominal wall is ideal. However, achieving this is an arduous task [7]. When the defect is too large, various myofascial flaps can be considered. Of these, rectus abdominis, a locoregional flap with a vigorous blood supply is used throughout to cover full-thickness abdominal wall defects [8].

The prime concern with this flap is the abdominal bulge or hernia defect that needs further closure with a mesh [9]. In our situation, the rectus abdominis was mobilized leaving the anterior sheath intact. A non-absorbable synthetic mesh(polypropylene) was used and fixed to the static pillars of the lateral abdominal wall and the mesh extended beyond the linea alba. The mobilized rectus muscle was used to cover the defect thus providing better dynamic pillar anchored reconstruction. There was adequate soft tissue coverage and hence primary closure was performed.

Furthermore, the external oblique, gracilis, latissimus dorsi, rectus femoris myocutaneous rotational flaps have been used to cover the thoracoabdominal and lower abdominal wall defects [8]. Besides, tensor fascia lata muscle flap has also been used to cover large donor area defects. But due to poor mechanical strength of the tissue, recurrent hernias have been reported [1]. Thus, in clinical practice, meshes play an important role in reconstruction.

Biological meshes like pig small intestinal mucosa and acellular dermal matrix have also been used with better results. These encourage the growth, adhesion of collagen along with neovascularization [10,11]. But the cost of such a large mesh and biodegradation of the mesh have precluded the widespread use of this mesh. In some situations, a two-step approach, which first includes regeneration and closure using a vacuum device followed by a reconstructive step devoid of mesh can also be used [6]. However static pillar reconstruction with a non-absorbable synthetic mesh(polypropylene) has a better long-term patient outcome when compared with bridging of the defect with mesh or biologic mesh alone [7].

Conclusion

Therefore, the ultimate goal of successful reconstruction of a large lateral abdominal wall defect is to improve the patient's quality of life, physical and social functioning along with prevention of complications that can negatively impact patients [3]. This report underlines the importance of considering various options available in surgical techniques to restructure the large lateral abdominal wall defects.

Lessons Learned

The consequences of suboptimal reconstruction of the large abdominal wall defects are multitude. The authors recommend meticulous planning and implementation of the various surgical techniques to preclude unfavorable patient complications in the future.

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