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ORIGINAL ARTICLE

Surgical Resection and Reconstruction Outcomes in Soft Tissue Sarcomas: A Plastic Surgery Perspective on Complications, Recurrence, and Survival

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ABSTRACT

Background: In general population adults and children are most frequently effect by Soft tissue sarcomas. About 90 various histological subtypes of soft tissue sarcoma were recently recognized.

Objective: The objective of this study was to evaluate the outcomes of surgical resection as well as reconstruction among individuals with various soft tissue sarcoma histological subtypes, with an emphasis on the issues, recurrence rates, and overall survival.

Methodology: This current study was carried out at the department of surgery, Avicenna Hospital, Lahore and Mardan Medical Complex, Mardan for a period of six months from October 2022 to March, 2023, after taking permission from the ethical boards of the hospitals. A total of 20 individuals were included in this study. The inclusion criteria for this study were histologically confirmed STS diagnosis and treatment at our facility. Individuals with a clinical history of pain and redness in any part of the their body swelling that gradually increased in size, or solid masses originating within deep sub-facial planes, were initially evaluated with an X-ray to rule out bony tumors, followed by an MRI with contrast. Following a suitable imaging examination, the conventional diagnostic approach was performing several core needle biopsies (with needles larger than 16G). Participants with soft tissue sarcoma were included in the study. Results of soft tissue sarcoma removal and repair among individuals with various histological subtypes, with an emphasis on overall survival, recurrence rates, and comorbidities. The statistical analysis was conducted using SPSS version 23.0.

Results: A total 20 individuals participated in the current study out of which 11(55%) were male and 9(45%) were female. 14(70%) were married and 6 (30%) were unmarred individuals Three patients were found to have sarcomas of the soft tissues of the scalp and three of the arms, four participants had forearm sarcoma, 4 had abdominal sarcoma, 4 had lower limb sarcoma, and one individuals possessed STS at the nape of the thigh. Histopathological analysis showed that the most common subtypes of ST S were pleomorphic sarcoma, liposarcoma, and leiomyosarcoma. Latissimus dorsi muscle was the most often employed flap, with 8 patients using it, 4 patients using radial forearm free flap, 2 patients using vertical rectus abdominis my cutaneous (VR AM) flap, and 2 patients using a free anterior lateral thigh (ALT) flap to rebuild their deformity. In four individuals, a musculocutaneous gastrocnemius flap was utilized for repair. Twelve months was the median follow-up period. Six out of twenty patients who received flap reconstruction experienced complications (two patients experienced complete Flap failure, two patients experienced seroma, and two patients experienced infection). The survival rate was 19 (95%) and the recurrence rate was 6 (30%).

Conclusion: According to the study's findings, surgical resection followed by immediate soft tissue repair has aided in the management of these complicated patients by lowering the risk of complications and recurrence.

Keywords: Surgical resection; Complications; Soft tissues

INTRODUCTION

The subgroup of solid tumors known as soft tissue sarcomas.it effect 1% of adults and 7% of children in the general population and 5 cases per 1 million are reported annually. [1] 90 various histological subtypes of soft tissue sarcoma were recently recognized. in children the most prevalent STS is Rhabdomyosarcoma but in adult undifferentiated pleomorphic sarcoma is more prevalent.[2-3] Soft, painless bumps are frequently the initial sign of cervical sarcomas. When the underlying cause is unknown, both the doctor and patient may fail to recognize the significance of swellings. When somebody initially shows up at the outpatient clinic following a delay in STS diagnosis, a considerably bigger tumor is usually evident. The size of the tumor and its proximity to surrounding tissues can cause complicated anomalies, thus the plastic surgeon's job of restoring these effects is crucial. A small number of STS can be observed in the retroperitoneal region, even though the bulk are found on the limbs and trunk.[4] There is an elevated possibility that the cancer will recur locally in patients with STS if it spreads to the lungs. The main sites for STS treatment should be tertiary care hospitals with expert teams of radiologists, physicians, cancer specialists, and ablative & reconstructive surgeons.[5-6] As the most important predictor of local recurrence, good margins on excision by surgery are essential for attaining the best possible local therapy.[7] The reality that this type of sarcoma usually occur close to or are physically associated with neurovascular systems. It raises the issue of achieving negative margins while maintaining function. Results from studies that used neoadjuvant radiation and a adjuvant to treat cancer showed promising numbers of survival of limbs and sufficient resection margins. However, many of these removals are difficult and may need extensive dissection or vascular restoration.[8] A subtype of malignant tumors known as soft tissue sarcomas (STSs) is uncommon and difficult to treat. These tumors can arise anywhere in the body and are mesenchymal in nature. The term "extensity STSs" (ESTSs) refers to the fact that between half and two-thirds of STSs impact the extremities. Surgery with negative margins, which normally necessitated amputation, has been used as a therapeutic procedure to provide the backbone.[9-10] The handicaps and disabilities that individuals have following amputation for ESTS treatment have resulted in significant suffering because of the decreased degree of functioning they encounter. Findings from a previous randomized prospective study that compared radiation-assisted limb-sparing surgery to amputation or with ESTS revealed no difference in OS or disease-free survival.[11] Surgery or therapy for ESTS is typically performed in conjunction with radiation in

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order to maintain the possible structure and function of the limbs and joints, either before, during, or after the procedure. The goal of treating non-metastatic sarcoma is to preserve a sufficient margin of good tissue while making progress. Tumor excision with R0 margins is regarded as the gold standard in STS.[7] According to the definition, "R0" entails cutting off the tumor's edges. As an alternative to the common practice of amputating, most patients in modern clinical practice have limb-sparing resections while retaining satisfactory survival rates.[8] Patients may receive adjuvant chemotherapy and radiation therapy as part of their treatment if their cancer has propagated to other bodily areas.[9] This study explored the effects of surgical resection and reconstruction on individuals with various histological subtypes of soft tissue sarcomas, with particular attention to overall survival, recurrence rates, and comorbidities.

METHODOLOGY

This current study was carried out at the department of surgery Avicenna Hospital, Lahore and Mardan Medical Complex, Mardan for a period of six months from October 2022 to March, 2023, after taking permission from the ethical boards of the hospitals. A total of 20 individuals were included in this study because since the margin of error was 10%, the confidence interval was 95%, and the sampling size was predicated on an 18% prevalence. The nonprobability sampling technique was used. The inclusion criteria for this study were histologically confirmed STS diagnosis and treatment at our facility. Information about participants' demographic data, cancer therapy techniques (chemotherapy and radiotherapy), tumor characteristics (location, size and histological subtypes), reconstructive techniques used following tumor ablation, as well as post-operative follow-up have all been collected from electronic health records. An X-ray was performed to rule out bony tumors before an MRI with contrast was performed .Individuals with a clinical history of pain and swelling(was 5 cm or larger) in any part of their body and swelling that grew in size over time, or solid masses that originated in deep sub-facial planes. Following a suitable imaging examination, the conventional diagnostic approach was performing several core needle biopsies (with needles larger than 16G). However, an incisional biopsy was performed for the superficial lesions. The biopsies were performed by the surgeons themselves. The procedure called for the biopsy route and the first surgery for eliminating the scar without inflicting any damage. All patients whose tumors were determined to be soft tissue sarcoma were included in the study. We always sought a second opinion from a pathologist when the first diagnosis was made outside of our facility.

For staging, the American Joint Committee on Cancer (AJCC) method was employed, which included documenting the tumor's depth, size, and position with relation to the muscle fascia. Certain cancer forms, including angio-sarcoma and Dermatofbro-sarcoma Protuberans (DFSP), are exempt from AJCC staging. A tumor board conference was then held to discuss all of these cases with the pathologist, radiology, ablative surgeon, plastic surgeon, and clinical oncologist. The management strategy for neoadjuvant chemotherapy and radiation therapy, STS removal, and reconstruction was outlined and recorded. The patient received a detailed explanation and discussion of the tumor board's recommendations, including all surgical choices, their advantages and disadvantages, and the function of adjuvant chemotherapy and radiation treatment or neo-adjuvant chemotherapy. Patients with Stage I–III cancers were scheduled for surgery, whereas those with Stage IV tumors were referred for radiation instead of surgery. The ablative surgeon (general surgeon, neurosurgeon, or orthopedic surgeon) carried out the tumor resection. By achieving histopathologically negative margins on frozen section, the R0 resection margins were obtained. From the frozen slice of the tumor bed, eight to ten tissue pieces were taken. Following the conclusion of the consultation, the plastic surgery department completed the immediate reconstruction. As part of the usual treatment strategy, radiation therapy was used for all tumors larger than 5 cm and deeply located STS after the original lesion healed in 3–4 weeks. When a real compartmental excision of the tumor-containing compartment was performed, radiation treatment was not taken into consideration. Participant were observed every three to six months for the first two to three years. Following then, every two years until the 5th year, and then every year after that. Results of soft tissue sarcoma removal and repair among individuals with various histological subtypes, with an emphasis on overall survival, recurrence rates, and comorbidities. The statistical analysis was conducted using SPSS version 23.0. For categorical data, frequencies and percentages were evaluated.

RESULTS

A total 20 individuals participated in the current study out of which 11(55%) were male and 9(45%) were female. 14(70%) were married and 6 (30%) were unmarred individuals .12(60%) individuals residency was rural area while 8(40%) were belong to urban region. 13(65%) individuals belonged to poor while 7(45%) belonged to high class family. (Table 1) .Five individuals received neoadjuvant radiation and whereas 3 patients submit to neoadjuvant chemotherapy. Following surgery, 4 individuals had adjuvant chemotherapy, while 11 patients received adjuvant radiotherapy. The tumors sizes varied from 5 cm to 17.5 cm round. Three patients were found to have sarcomas of the soft tissues of the scalp and three of the arms, four patients had forearm sarcoma, four patients had abdominal sarcoma, four patients had lower limb sarcoma, and one individuals possessed STS at the nape of the thigh. Histopathological analysis showed that the most common subtypes of ST S were pleomorphic sarcoma, liposarcoma, and leiomyosarcoma. Other subtypes that were identified included dermatoïbrosarcoma protuberans, chondrosarcom a, synovial sarcoma. One patient's sample was diagnosed as unclassified sarcoma. Latissimus dorsi muscle was the most often employed flap, with 8 patients using it, 4 patients using radial forearm free flap, 2 patients using vertical rectus abdominis my cutaneous (VR AM) flap, and 2 patients using a free anterior lateral thigh (ALT) flap to rebuild their deformity. In four individuals, a musculocutaneous gastrocnemius flap was utilized for repair.

Table 1: Demographic features of the study population

Parameters		Frequency /percentage
Mean age		42.1
Gender	Male	11(55%)
	Female	9 (45%)
Marital status	Married	14(70%)
	Unmarried	6(30%)
Residency	Urban	8(40%)
	Rural	12(60%)
Economic status	Poor	13(65%)
	High class	7(45%)

Table 2: Results Displaying Tumor Type, Location, and Final Reconstruction

Tumor location	Cases	Tumor nature (sarcoma)	RECONSTRUCTION
Scalp	3	Dermatofibro	Free Latissimus Dorsi Flap
		Pleomorphic	Free Latissimus Dorsi Flap
Arm	3	Synovial	Free Radial Fore aram Flap
		Pleomorphic	Free radial Fore aram Flap
Fore arm	4	Spindle celll	Free Latissimus Dorsi Flap
		Liposarcoma	Free Latissimus Dorsi Flap
Nape of Neck	3	Pleomorphic	Free radial Fore aram Flap
Lumbar Area	3	Leiomyosarcoma	Pedicled Latissimus Dorsi Flap
Abdominal Wall	3	Leiomyosarcoma	Vertical Rectus Abdominis Flap
		Liposarcoma	Vertical Rectus AbdominisFlap
Lower Limb	1	Liposarcoma	Pedicled Gastrocnemius Flap

Twelve months was the median follow-up period. Six out of twenty patients who received flap reconstruction experienced complications (two patients experienced complete Flap failure, two

patients experienced seroma, and two patients experienced infection). The survival rate was 19 (95%) and the recurrence rate was 6 (30%). table 3

Table 3: Outcomes after treatment

Parameter	
Complications	
Flap failure	2(10%)
Sarcoma	2(10%)
Infection	2(10%)
Recurrence rate	
Yes	6(30%)
No	14(70%)
Rate of survival	
Yes	19(95%)
No	1(5%)

DISCUSSION

Early multidisciplinary approach is required to prepare each individual undergoing treatment for soft tissue sarcoma or for reconstruction. If an individual has a soft-tissue tumor of unknown origin he or she must all be sent to a specialized sarcoma clinic. Magnetic resonance imaging (MRI) is the gold standard diagnostic imaging technique for identifying STS.It evaluate the size of tumor its invasion and spreading and also examine the composition of lymph node .[10] But for the diagnosis of larger size tumor Core the needle incisional, and excisional biopsy are the three techniques used . For superficial masses having a diameter of 3 cm or less above eleven cm, excisional biopsies are a suitable option. Current study indicates that core needle biopsy, with many clearances including a gauge size of sixteen , can identify subtypes of STS with fewer issues than incisional biopsy. Since STS comprises a wide variety of tumor types, histological results might vary and diagnostic mistakes are frequent. Due to the wide range of potential STS diagnosis, only a highly skilled sarcoma pathologist can[11] It is recommended that surgeons, ablative and plastic surgeons, members of a number of scientific tumor boards, and others get together to evaluate treatment plans. Radiation treatment and chemotherapy are examples of neoadjuvant therapies, although they are not the only ones. When performing surgery on patients, a multidisciplinary team must examine them before, during, and after the procedure. To avoid recurrence, radiation therapy is an essential part of grade II, III, and IV STS treatment regimens.[12-13] Although there is no new suggestion to support the assertion that adjuvant and neoadjuvant radiation techniques are superior, there is some debate regarding how many benefits neoadjuvant radiation offers over adjuvant radiotherapy, including reduced edema and joint stiffness, lower fibrosis, and longer-term follow-ups. This is because there is a higher chance of flap failure and acute wound complications. Systemic chemotherapy is a successful treatment for skin cancers that have progressed or spread.[14-15] Conventional chemotherapy that is cytotoxic has relied on derivatives of ifosfamide and anthracyclines (doxorubicin).[16-17] However, because of their extreme toxicity and subpar treatment outcomes, recent investigations have raised questions about their effectiveness. Due to advancements in molecular etiology, new targeted medications have been created for liposarcoma and leiomyosarcoma, including trobetedin .[18-19] After histological confirmation of STS, extensive excision is required to ensure margins devoid of tumors as tiny as microscopic particles. Insufficient marginal resections cannot ensure R0 resection. Although amputation of the diseased limb were once the mainstay of therapy for sarcoma, recent studies show that R0 resection can produce the same or better long-term outcomes without amputating the affected limb. A broad resection ideally renders the tumor invisible by meticulously excising it while keeping the surrounding tissue unharmed. Marginal resections cannot guarantee R0 resection; examples of how preservation of function is achieved include radical tumor excision with nearby muscle and nerve tissue preserved or functional deficiencies corrected by further therapies. Even despite the afflicted person's amputation.[20]

Following R0 resection, it is imperative to employ vascularized soft tissue for damage repair as away. Furthermore, if the tumor does not pass through the muscle's origin or insertion, the entire compartment does not need to be removed. When combined with aggressive tumor treatment, removing the adjacent muscle tissue around the tumor without impairing function was just as beneficial in terms of long-term survival as treating the entire compartment. To avoid damage to the underlying nerves due to inadequate tumor excision, epineural dissection is carried out. [21] Amputation of a limb may be necessary when a cancer cell has spread too far, when the individual is too old or ill to have a complicated repair, or in other extreme situations. Surgical therapy can be broadly defined as the elimination of cancer, the repair of bone and soft tissues, the restoration of nerves and vessels, or functional reconstruction.[22] The complexity of surgically treating STS in the limbs is demonstrated by the variety of ðaps employed for reconstruction.[23] Examining the spot, diameter, depth, and adjacent vessels is crucial before selecting the optimal flap. Whether rebuilding takes place concurrently with tumor removal or following histological confirmation of a R0 resection depends on the surgeon's judgment. While a one-step surgery offers the advantages of shorter hospital stays and quicker recovery, a two-step approach can reduce difficulties brought on by positive margins following the initial resection and enable more precise planning of the necessary repair. Six out of twenty patients who had flap repair experienced complications in our study (two patients experienced total flap failure, two patients experienced seroma, and two patients experienced infection). The survival rate were 19 (95%), while the recurrence rate was 6. (30%).The findings were consistent with earlier studies.[17-20] However, a two-step procedure is required after issues are identified. According to recent studies, vacuum-assisted closure therapy, or NPT, can reduce the likelihood of wound issues during excision and the reconstruction phase.[24] It is essential to assess the vascular state in the limbs, particularly around the tumor, before developing surgical methods for each patient.[25]Moreover, intraoperative imaging with plasma asymmetry analysis is a possibility to further improve reconstruction safety and avoid ðap loss.[26] In situations where only large vessels in the tumor region are invading the tumor and free flap reconstruction is necessary, it might be possible to avoid ligating the vessels during resection in order to prevent the development of no recipient vasculature that supports the anastomosis of free vessels if a one-step approach is used.[27] Following the removal of the tumor the donor vessels are no longer present. The rest of the therapy can be administered in one or two steps, or the donor vasculature can be constructed as an arteriovenous loop. Two types of pedicled flap that can be used to hide effects are the ALT or the VRAM. They are frequently applied to the groin and anterior lateral thigh.[28] A combination of the parascapular or serratus anterior muscles and the latissimus dorsi may be employed to strengthen the ðap region for fine motor exercises. While nerve grafts can aid in the restoration of large severed nerves following surgery, tendon transplants are frequently necessary for the best possible motor recovery. Another popular practice is doing functional muscle transfers. The small sample size raises concerns about the validity of the study. Further research is need to confirm these findings, but the patterns show how important early patient assessment is for quick reconstructive surgery after Ro resection. The lack of an internal control group constitutes only one of the study's many shortcomings that need to be noted. Furthermore, the short size and variability of the series make further subgroup analysis impossible. Despite being a nationwide reference institution, size of sample and diagnostic heterogeneity are related to the frequency of specific tumors.

CONCLUSION

The results of the study indicate that by reducing the risk for complications and recurrence, surgical resection followed by rapid soft tissue reconstruction has helped with the care of these complicated participants

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