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ORIGINAL ARTICLE

Reconstructive

Multidisciplinary Oncoplastic Approach Reduces Infection in Chest Wall Resection and Reconstruction for Malignant Chest Wall Tumors

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Background: Management of complex thoracic defects post tumor extipiration is challenging because of the nature of pathology, the radical approach, and the insertion of prosthetic material required for biomechanical stability. Wound complications pose a significant problem that can have detrimental effect on patient outcome. The authors outline an institutional experience of a multidisciplinary thoracic oncoplastic approach to improve outcomes.
Methods: Prospectively collected data from 71 consecutive patients treated with chest wall resection and reconstruction were analyzed (2009–2015). The demographic data, comorbidities, operative details, and outcomes with special focus on wound infection were recorded. All patients were managed in a multidisciplinary approach to optimize perioperative surgical planning.
Results: Pathology included sarcoma (78%), locally advanced breast cancer (15%), and desmoids (6%), with age ranging from 17 to 82 years (median, 42 years) and preponderance of female patients (n = 44). Chest wall defects were located anterior and anterolateral (77.5%), posterior (8.4%), and apical axillary (10%) with skeletal defect size ranging from 56 to 600 cm^2 (mean, 154 cm^2). Bony reconstruction was performed using polyprolene mesh, methyl methacrylate prosthesis, and titanium plates. Soft tissue reconstructions depended on size, location, and flap availability and were achieved using regional, distant, and free tissue flaps. The postoperative follow-up ranged from 5 to 70 months (median, 32 months). All flaps survived with good functional and aesthetic outcome, whereas 2 patients experienced surgical site infection (2.8%).
Conclusions: Multidisciplinary thoracic oncoplastic maximizes outcome for patients with large resection of chest wall tumors with reduction in surgical site infection and wound complications particularly in association with rigid skeletal chest wall reconstruction. *(Plast Reconstr Surg Glob Open 2016;4:e809; doi: 10.1097/GOX.0000000000000751; Published online 20 July 2016.)*

Chest wall resection and reconstruction for malignant tumors are associated with significant morbidity ranging from 16% to 69%. The wide spectrums of complications include wound infection, paradoxical movement, respiratory failure, and chronic pain.[1,2] Reconstruction with rigid prosthesis is required in moderate and large defects to improve chest wall stability and improve ventilation. Wound complications, including surgical site infection (SSI), pose an even greater problem in patients with rigid chest wall skeletal reconstruction, especially in those who are immunocompromised secondary to cancer and adjuvant chemo/radiotherapy.[3–8] Regardless of the type of rigid fixation performed, the reported incidence of wound dehiscence and infection in the literature ranges between 6% and 22%. These complications have a detrimental effect on short- and long-term outcomes.[2,7,9,10] The consideration of oncological, anatomical, and comorbiditiy factors is important for a detailed strategic plan regarding the tumor resection and

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Part of this work has been presented as oral presentation and as invited speaker session in (1) 24th Annual Meeting for European Musculo-Skeletal Oncology Society (EMSOS), Ghent, 2011; (2) 32nd Annual Meeting for European Society of Surgical Oncology (ESSO), Valencia, 2012; (3) 29th Annual Meeting for European Association of Cardio-Thoracic Surgery (EACTS), Vienna, 2013; Annual Meeting for Society of Cardiothoracic Surgery of Great Britain and Ireland (SCTS) Edinburgh, 2014; and (5) Annual Meeting for Society of Cardiothoracic Surgery of Great Britain and Ireland (SCTS) Manchester, 2015.
Received for publication June 17, 2015; accepted April 12, 2016.

DOI: 10.1097/GOX.0000000000000751

recruitment of well-vascularized soft tissue cover. This cover not only protects any prosthesis and obliterates dead space, helping resist and minimize the incidence of wound complications, but also improves the aesthetic outcome. The purpose of this study was to assess the benefit of a multidisciplinary thoracic oncoplastic approach with specific focus on wound complications and reduction of SSI incidence.

MATERIAL AND METHODS

Prospectively collected data from 71 consecutive patients who underwent chest wall resection and reconstruction for malignant chest wall tumors in the period between January 2009 and January 2015 were reviewed. All patients were managed in a multidisciplinary approach comprising thoracic surgeon (M.K.), reconstructive surgeon (H.H.K.), breast and orthopedic surgeons, radiologist, oncologist, physiotherapist, and a reconstructive clinical nurse specialist to optimize the perioperative preparation and treatment plan. The treatment plan involves routine preoperative preparation and pulmonary function test to assess fitness, radiological investigations including computed tomographic (CT) scan and/or angiography and magnetic resonance imaging, oncolgical adjuvant therapy, surgical resection, and possible skeletal and soft tissue reconstructive options.

Data Collection

The demographic information, comorbidities, and previous history of malignancy and treatment especially radiotherapy were collected. The information in relation to the tumor, histopathalogical diagnosis, and details of adjuvant chemotherapy and radiotherapy received was obtained. Results of diagnostic workup included standard chest x-ray, CT scan, and magnetic resonance imaging to delineate the extent of bone, soft tissue pleural, mediastinal, and abdominal involvement were recorded. The operative details identified the number of resected ribs and costochondral junctions along with other structures that were resected as a part of the tumor extipiration and included sternum, clavicle, vertebral transverse process, diaphragm, lung, liver, pericardium, and overlying soft tissue. The size of skeletal defect and overlying cutaneous soft tissue defect if encountered were recorded in all patients. Methods of restoration of the skeletal chest wall integrity and soft tissue coverage were also documented. The postoperative outcomes in terms of length of stay, complications, and particularly postoperative SSI and wound dehiscence were identified from the patient records. Postoperative infection was classified as early when it occurred during the first month, "delayed" in months 2 to 6, and "late" after sixth month according to the bone and joint prosthetic device infection in clinical practice. From the anatomical point of view, SSI was also classified as minor superficial SSI requiring conservative management or deep major SSI requiring reoperative intervention. The postoperative follow-up ranged from 5 to 70 months (median, 32 months).

Disclosure: *The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.*

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Operative Considerations

All patients identified to have resectable malignant chest wall tumors by sarcoma or breast multi-disciplinary team were reviewed by the multidisciplinary thoracic oncoplastic team. Surgery was planned after thorough clinical examination, radiological investigations, and standard preoperative assessment, including Methicillin Resistant Staphylococcus Aureus screening. Resection and reconstruction were performed as a one-stage procedure in all patients. Surgical incisions were designed by both the thoracic and the reconstructive surgeons simultaneously to include biopsy sites and maximize the use of regional muscles and soft tissue for the reconstructive options. In the majority of cases, the thoracic surgeons would initially perform the resection and restore the skeletal wall integrity; this would be followed by harvesting and insetting the selected flap before closure (Figs. 1–4) (**Supplemental Digital Content 1**, http://links.lww.com/PRSGO/A226). In selected cases, the reconstructive surgeon would harvest the selected regional flap first to facilitate tumor extipiration and also to salvage the regional flap from being damaged through a conventional thoracic approach (Figs. 5–8). In 4 cases where the tumors were located anteriorly, the thoracic and reconstructive teams resected the chest wall tumor and harvested the free microvascular muscle-sparing transverse rectus abdominus myocutaneous (MSTRAM) flap simultaneously, which had a significant reduction in the operative time. The decision to perform skeletal reconstruction (nonrigid or rigid) or no reconstruction depended on the site and size of the defect, putting in consideration that lesions less than 5 cm in size in any location and those up to 10 cm in size posteriorly did not require reconstruction. On the other hand, posterior defects in proximity to the tip of the scapula and larger defects mostly anterior and lateral, which are likely to produce paradoxical chest wall motion, did require reconstruction. The choice of rigid fixation was mainly determined by the site and extent of defect, and thoracic surgeon preference with the first choice to achieve chest wall stability was using methyl methacrylate marlex mesh (MMM) "sandwich" technique as it is easy to construct the prosthesis to any size and contour. Our second choice would be using titanium plates and rib clips (Strasbourg Thoracic Osteosyntheses System [STRATOS]; MedXpart Gmbh, Heitersheim, Germany) to decrease the foreign materials while maintaining the same structural support.

A prerequisite for sufficient amount of healthy remnants of rib segments post resection is required to anchor the rib fixator, which is subsequently fixed to the titanium plates by rib clips. Respectively, the flap choice was dictated by the site, extent of defect, availability of tissues, and preference of the reconstructive surgeon. Our approach

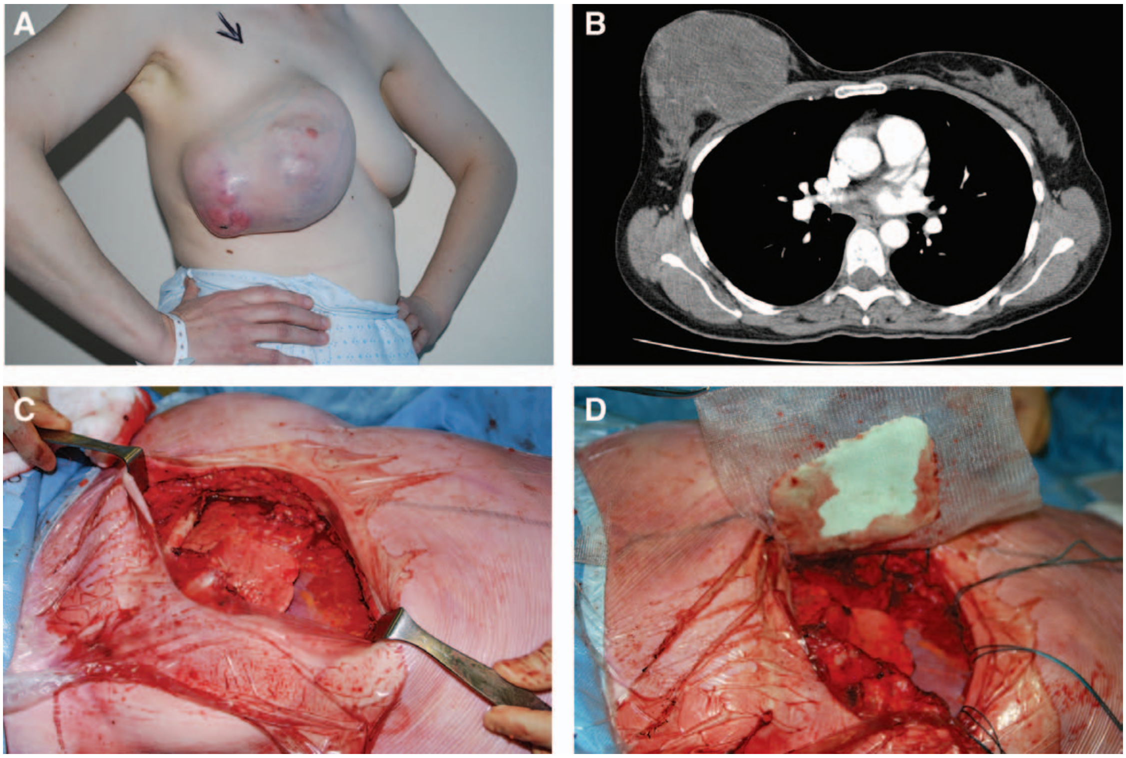


Fig. 1. A, Large moderate grade malignant phyllodes tumor of the right breast with pressure necrosis of overlying breast skin. B, Computed tomographic (CT) scan defining the lesion with extensive loss of tissue plan along the lower half of the chest plane underlying ribs and intercostal space, necessitating the resection of ribs to achieve negative surgical margins. C, Intraoperative photo post en bloc tumor resection, including 4 ribs demonstrating the skeletal defect exposing underlying thoracic viscera. D, Methyl methacrylate cement sandwiched in polyprolene mesh in preparation to reconstruct the skeletal defect.

Fig. 2. Postoperative (6 months) photograph showing soft tissue coverage achieved using muscle-sparing–free abdominal rectus abdominus muscle flap (type I) with complete healing and acceptable aesthetic results.

to provide soft tissue reconstruction comprised using locoregional flaps as the first choice, including latissimus dorsi pedicled flaps, pectoralis major, and omental flap; however, in young patients with appropriate tissue availability, free microvascular MSTRAM flap would be considered as the first choice to minimize functional muscular deficit. In addition, when utilization of locoregional flap was deemed not feasible because of direct tumor involvement, vascular compromise, previous radiotherapy, or previous surgery, free microvascular MSTRAM was performed (Figs. 1 and 3). Special attention was given to patient's life style and hand dominance while planning for soft tissue reconstruction, for example, using left pectoralis major in right-handed patients with central sternal chest wall defects (**See video, Supplemental Digital Content 2**, which demonstrates en bloc resection of chondrosarcoma left costal margins; skeletal reconstruction was achieved with titanium bars, whereas soft tissue reconstruction was achieved with vertical rectus abdominus myocutaneous pedicled flap. This video is available in the "Related Videos" section of the Full-Text article on PRSGlobalOpen.com or available at http://links.lww.com/PRSGO/A227). As a routine, all surgical sites were copiously irrigated using meticulous pulse-jet lavage using 3L of saline (0.9% NaCl) solution to mechanically remove any debris and diathermized loose tissue, which could potentially act as a nidus for infection. Large bore chest tubes were placed in

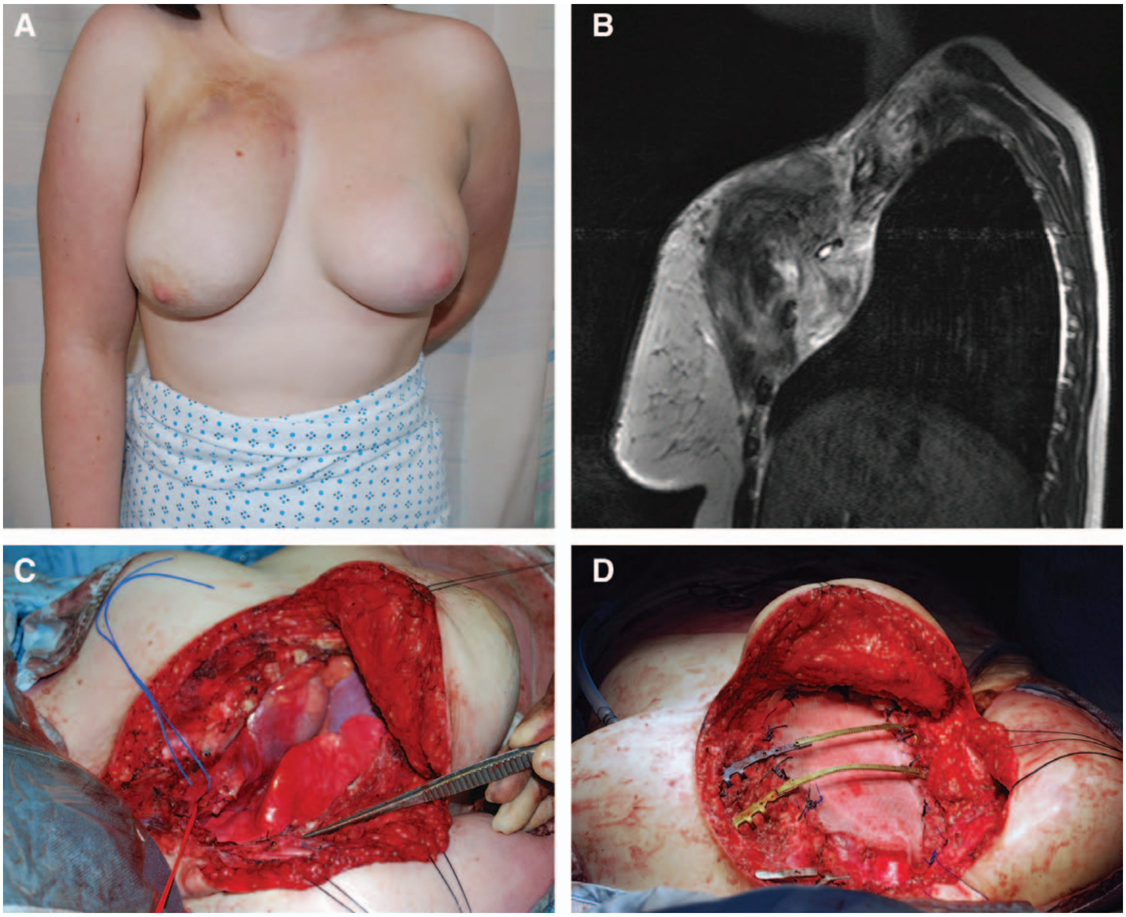


Fig. 3. A, Large aggressive malignant desmoid tumor in the right upper anterior chest wall with preoperative radiotherapy, note radiotherapy skin changes. B, Magnetic resonance imaging delineating the extent of the mass, which is insinuating itself between the intercostal spaces and extending into the pleural space. C, Posttumor extipiration with resection of mass, including right first to fifth ribs, costal cartilages, clavicle, part of manubrium, and sternocleidomastoid, preservation of neurovascular bundle, and innominate vein. D, Reconstruction of the skeletal defect using polyprolene mesh and STRATOS osteosynthesis titanium plates.

the thoracic cavity, whereas suction drains were inserted in front of and behind the mesh and flap. The duration of the drainage depended on the clinical, chest x-ray, and biological follow-up. Sixty-eight patients (95.7 %) were extubated at the end of surgery and were transferred to the Thoracic High Dependency Unit; 3 patients were extubated in the intensive care unit within 12 hours. Standard flap observation chart protocol was followed, including Doppler signal and, when possible, color, temperature, and capillary refill.

All patients received antibiotics intravenous therapy at induction according to local microbiology guidelines to determine appropriate tissue penetrability with special reference to bone and joint infections for prosthetic device[11] and continued routinely for 48 hours postoperatively followed by oral therapy for the duration of time the drains remained in situ. An attempt to minimize the bioburden was achieved by soaking the surgical mesh in antibiotic solution. Intraoperative collagen implant impregnated with aminoglycoside antibiotic gentamicin (Collatamp, EUSA Pharma, Hempstead, UK) was inserted in the surgical field before wound closure. In addition to the routine chest physiotherapy, all patients underwent structured physiotherapy and rehabilitation program for the donor site depending on the flap selection.

RESULTS

The patients' ages ranged between 17 and 82 years (median, 42 years) and preponderance female patients (n = 44). The spectrum of histopathology diagnosis is outlined in Table 1. The average numbers of ribs resected with adjoining costochondral cartilage were between 2 and 8 ribs (median, 3). The site and extent of defect determined the choice of skeletal chest wall reconstruction (Table 2), and two-tailed P value (Fisher exact test) revealed that the groups (rigid and nonrigid) were statistically different (<0.0001) when comparing the choice of skeletal reconstruction in relation to the site of defect. The integrity of the chest wall was achieved using nonrigid fixation with polyprolene mesh in 12 patients (17%) on the account of location and smaller size of the defect. Rigid reconstruction was achieved using MMM in 29 patients

(41%) and titanium bars and rib clips (STRATOS) in 23 (32%), whereas spinal metal rods were used in 1 patient. Six patients (8%) required no skeletal reconstruction predominately in the apical and axillary regions, and only soft tissue resurfacing reconstruction was performed for cover and cosmesis. The range of the surface area of the skeletal chest wall defect ranged from 56 to 600 cm^2 (mean, 154 cm^2).

Fig. 4. Postoperative (6 months) picture showing complete survival of free muscle-sparing TRAM (type I) and healing of wounds with primary intention.

As a part of the radical approach, skin defects were encountered in 32 patients (45%) with a surface area ranging from 70 to 1,225 cm^2 (mean, 200 cm^2). Fourteen patients had neoadjuvant chemotherapy (19.7%); 17 received postoperative radiotherapy (24%), whereas 15 had previous history of radiotherapy (21%). In this cohort of patients, diabetes ($P = 0.11$), body mass index (BMI) of more than 30 kg/m^2 ($P = 0.37$), smoking ($P = 0.18$), age ($P = 0.51$), skeletal chest wall defect size ($P = 0.26$), and rigid and nonrigid reconstruction ($P = 0.67$) were statistically insignificant (Fisher exact test) in affecting the incidence of SSI. Eighty-nine flaps (Table 3) were used in this series; of those, 14 patients (20%) required harvesting 2 flaps, whereas in 2 patients, 3 flaps (3%) were harvested to provide complete coverage because of the large extent of soft tissue deficit. In 7 patients, split skin graft was performed in conjunction with latissimus dorsi muscle flap because of a lack of excess skin component at donor site. All flaps survived 100%; 1 patient developed hematoma at donor site (back), which was surgically evacuated within the first 24 hours. The length of stay for all patients ranged from 4 to 14 days (median, 6 days). No readmissions occurred within 30 days from the discharge; on the other hand, no

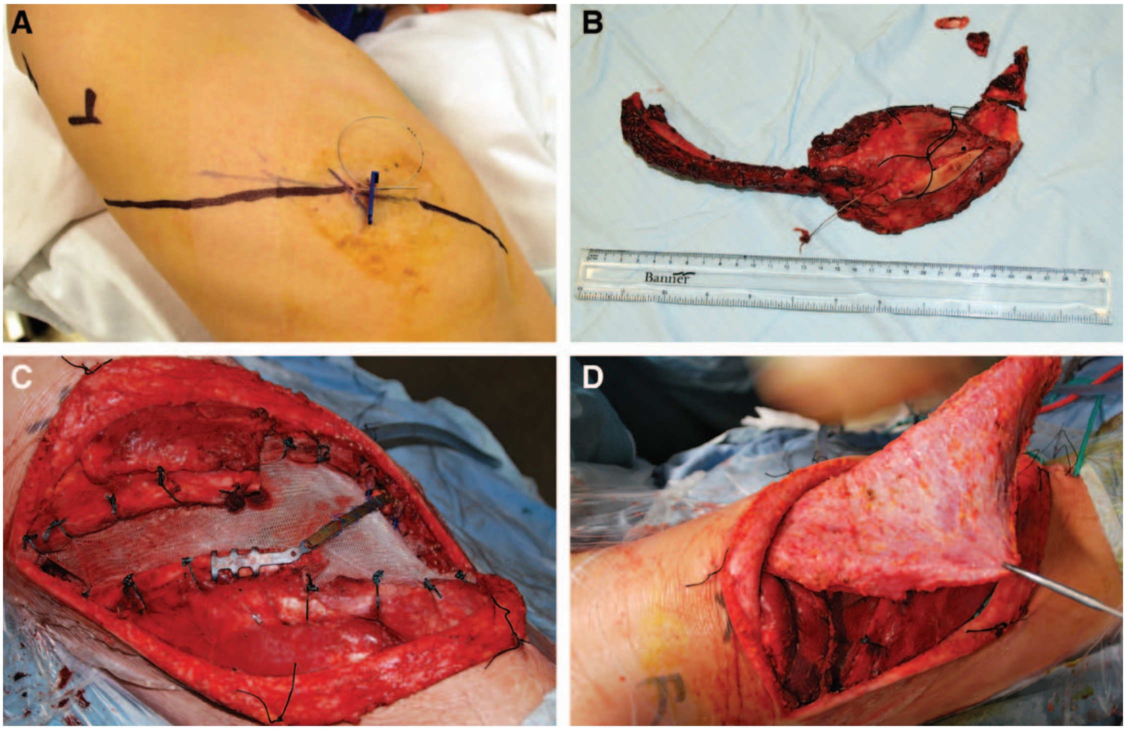


Figure 5. A, Ewing sarcoma in the right eighth rib. The patient underwent neoadjuvant chemotherapy for down staging and systemic therapy; note the preoperative wire localization to identify the affected rib. B, Post en bloc resection specimen revealing the entire eighth rib with soft tissue mass, part of seventh and ninth ribs, including overlying skin paddle with wire in situ (previous biopsy site). C, Skeletal defect reconstructed with polyprolene mesh and one STRATOS osteosynthesis titanium bar; note the latissimus dorsi muscle flap folded subcutaneously, which has harvested beforehand to allow exposure and resection of tumor. D, Soft tissue coverage was achieved with latissimus dorsi muscle flap only as no skin deficiency was encountered, flap insetted, and suture to edges of the defect.

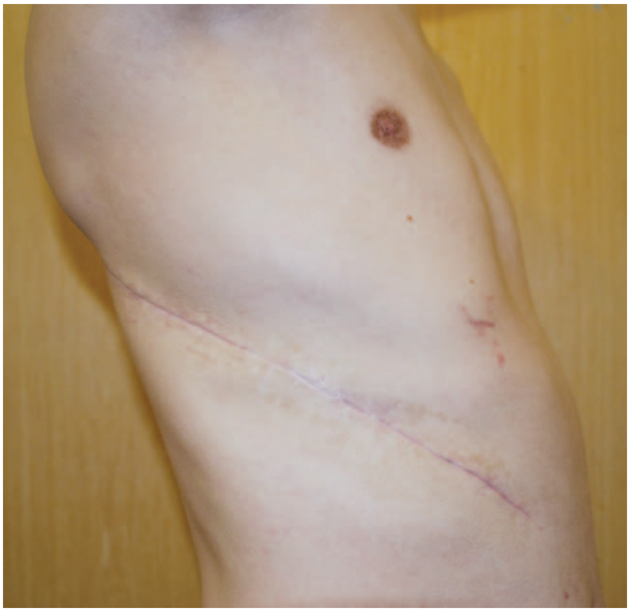


Fig. 6. Postoperative/radiotherapy (6 months) photograph revealing complete scar healing with primary intention with minimal skeletal contour deformity.

mortality was experienced in this cohort within the first 6 months. Mid- and long-term follow-up revealed only 1 experienced mild functional disability with limitation of the shoulder movement post latissimus dorsi flap harvesting. Timely adjuvant therapy was achieved when required in all appropriate cases. All patients showed complete healing with primary intention except 2 patients (2.8%). Both patients who developed wound complications were in the rigid reconstruction group anterior chest wall ($P = 0.677$).

Wound Complications

Patient 1

Sixty-one-year-old male patient with a chondrosarcoma of sternum, who was an active smoker, with type II diabetes and BMI of 32 kg/m^2, underwent en bloc resection. Skeletal restoration was achieved with MMM, whereas soft tissue reconstruction was achieved to cover prosthesis with bilateral rotational pectoralis major flap and omental flap and primary closure of native skin. On day 8, patient developed full-thickness necrosis of the native skin, and microbiology swab revealed colonization with *Staphylococcus aureus*. Debridement of necrotic tissues (area 35 m^2) and vacum assisted closure therapy undercover of antibiotic prophylaxis according to sensitivity was performed and

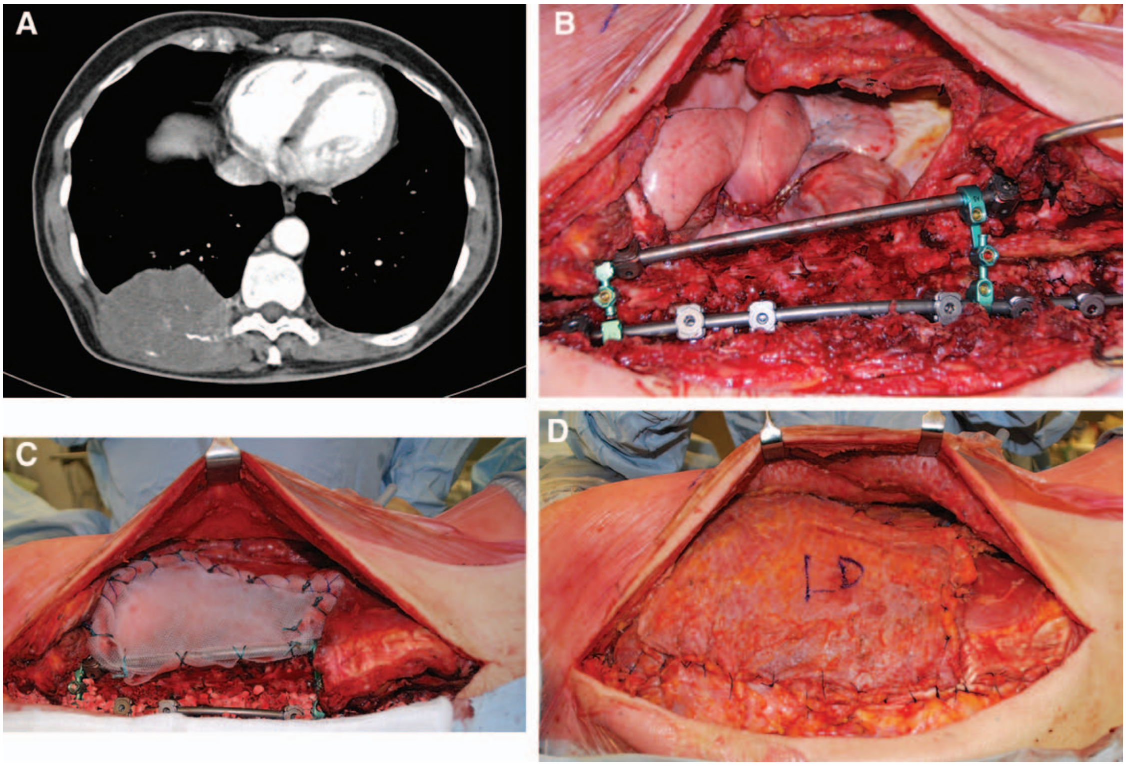


Fig. 7. A, Computed tomographic scan showing a large leiomyosarcoma right posterior chest wall post neoadjuvant chemotherapy and radiotherapy with weak response; note that fat plane with lattissimus dorsi is preserved. B, Harvesting and dissection of the latissimus dorsi were performed first to salvage muscle allowing exposure of tumor in preparation of resection; the photo is showing the skeletal defect post resection of 3 ribs, including transverse process of T8–T9–T10 to posterior axillary line and partial pneumonectomy. Note that the latissimus dorsi flap has been folded laterally away from the resection zone. Stabilization of the spine was achieved using prosthetic spinal rods fixed to the transverse process. Note the stapler line at the resected lung zone. C, Nonrigid reconstruction of the skeletal defect achieved by using polyprolene mesh. D, Reinsetting of latissimus dorsi flap to achieve full soft tissue coverage.

Fig. 8. Postoperative (12 months) photograph showing complete healing with mature scar and no functional or neurological deficit in lower limbs.

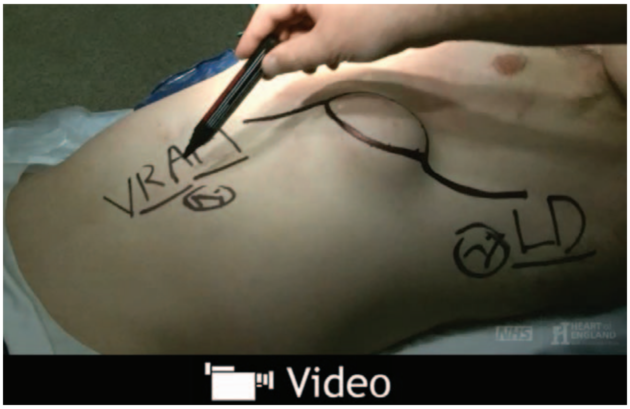
subsequently, a split thickness graft was applied on the underlying healthy flaps, achieving complete healing and maturation.

Patient 2

Sixty-four-year-old female patient with chondrosarcoma left fourth rib with a BMI of 33 kg/m^2 underwent en bloc resection. Skeletal restoration was achieved with MMM, whereas soft tissue reconstruction was achieved to cover prosthesis with latissimus dorsi muscle flap with complete healing achieved. She developed streptococcus A hemolytic infection 1 year post surgery, which was acquired in the community and presented with sepsis, and CT scan revealed a periprosthetic infective process. Surgical exploration was performed with washout and VAC therapy for 2 weeks; this was followed up by secondary closure with complete healing and salvage of the prosthesis.

DISCUSSION

Surgery represents the corner stone for management of chest wall malignancy; tenets of chest wall resections and reconstruction are well known, achieving adequate radical resection associated with maintenance of chest wall stability, lung function, and acceptable cosmetic results.[3,5] The wide resection of chest wall results in large defects, instability, and interference with respiratory mechanics, with a potential increase in postoperative morbidity and mortality. Hence, reconstruction advocates a crucial role in maintaining structural and functional integrity. However, the use of prosthetic material for this purpose comes on the expenses of increased risk of infection, particularly in immunocompromised patients secondary to malignancy and adjuvant systemic or local chemo/radiotherapy.[7,8] Wound complications are a frequent source of major morbidity in patients with mesh reconstruction with infection rates recorded in the literature between 6% and 22%.[2,7,9,10] The recruitment of healthy versatile soft tissue is paramount to provide cover to prosthesis, seal the pleural space, protect underlying viscera, obliterate dead space, and prevent infection.[3,5,12] The general consensus accepted for chest wall skeletal recon-



Video Graphic 1. See video, Supplemental Digital Content 2, demonstrating the preoperative planning and design for resection of chondrosarcoma left costal margin by the thoracic oncoplastic team. The options for potential soft tissue reconstruction either using latissimus dorsi or vertical rectus myocutaneous flap (VRAM) are outlined. During en bloc resection of the tumor, the reconstructive surgeon is assessing the proximity of the resection margins to the left superior epigastric vessels, which could be potentially used as main blood supply for the left VRAM if integrity was preserved. This was followed by skeletal reconstruction using STRATOS bars and polyprolene mesh by the thoracic surgeons. Assessing of the resultant defect was performed to determine the extent of the required skin paddle. Harvesting and insetting of the VRAM flap with primary closure. This video is available in the "Related Videos" section of the full-text article on PRSGlobalOpen.com or available at ***http://links.lww.com/PRSGO/A227***.

Table 1. Preoperative Histopathological Diagnosis Confirmed by Core Biopsy

Histopathology	Patients, n (%)
Chondrosarcoma	25 (35)
Local advanced breast cancer	11 (15)
Ewing's sarcoma	9 (13)
High-grade pleomorphic sarcoma	8 (11)
Desmoid tumor	4 (6)
Radiation-induced sarcoma	3 (4)
Osteosarcoma	3 (4)
Malignant fibrous histocytoma	3 (4)
Leiomyosarcoma	3 (4)
Inflammatory myofibroblastic tumor	2 (3)
Total	71

Table 2. Choice of Skeletal Reconstruction in Relation to the Site of Chest Wall Defect

	No Reconstruction	Nonrigid Reconstruction	Rigid Reconstruction
Anterior/anterolateral, 55/71 (77.5%)	0	5	50
Posterior, 6/71 (8.4%)	0	4	2
Apical/axillary, 10/71 (14%)	6	3	1
	6/71 (8.4%)	12/71 (17%)	53/71 (74.6%)

Two-tailed *P* value (Fisher exact test) revealed that the groups were statistically different (<0.0001) when comparing the choice of skeletal reconstruction in relation to the site of chest wall defect.

Table 3. Modalities of Flaps for Soft Tissue Coverage

Modality of Flaps	Patients, n (%)
Unilateral lattisimus dorsi	35 (49)
Free microvascular muscle-sparing transverse rectus abdominus myocutaneous	8 (11.2)
Unilateral pectoralis major	5 (7)
Dermal flaps	4 (5.6)
Pedicled vertical rectus myocutaneous	3 (4.2)
Pedicled transverse rectus myocutaneous	2 (2.8)
Combined lattisimus dorsi and serratus anterior	9 (total n = 18) (12.6)
Bilateral pectoralis major	5 (total n = 10) (7)
Bilateral pectoralis major and omental flap	2 (total n = 6) (2.8)

struction, which we also applied in our series, is that any defect less than 5 cm in size in any location and those up to 10 cm in size posteriorly do not need reconstruction for functional reasons. On the other hand, posterior defects in proximity to the tip of the scapula and larger lesions mostly anterior and lateral are likely to produce paradoxical chest wall motion; therefore, they require reconstruction.[3,6,13–15] The majority of the defects in this series involved the anterior and anterolateral chest wall (77%) with mostly requiring rigid skeletal reconstruction to prevent chest wall instability as reported in the literature.[3,6,7,14,16,17] The latissimus dorsi is considered as a workhorse regional flap for reconstruction in this patient population, which has been demonstrated in previous reviews.[18–23] In our series, it was the most frequently used flap (35/71 [50%]) either as a muscle alone or myocutaneous to cover mainly anterior or anterolateral defects. Other regional and distant flaps, including pectorals major, omentum, and serratus anterior rectus abdominus, played an important role in the reconstructive armamentarium in this cohort of patients, which has been also reported in the literature.[3,6,23] The inclusion of microvascular free tissue transfer techniques in the reconstructive armamentarium has expanded the indications for the management of these patients with preservation of more functional integrity and better cosmetic outcomes, which has also been reported in the literature.[7,24,25] When the utilization of regional flap was deemed not feasible because of direct tumor involvement, vascular compromise or previous radiotherapy free microvascular autologus tissue transfer using MSTRAM flap was performed accounting for 11.2% (8/71) of the patients. Utilization of other free flaps has been reported in the literature in this context, including tensor fascia lata and anterolateral thigh flaps, to avoid interference with the respiratory functions[7,24,25]; however this has not been encountered in our series when using free microvascular TRAM type I flaps. In addition, free MSTRAM also provided less functional and muscular deficit; hence, it was used as the first choice in younger patients. Risk factors that may predispose to postoperative wound complications because of alteration in wound environment have been mentioned in the literature, including the type of prosthesis, the size of chest wall defect, concomitant adjacent structure resection, and medical comorbidites, including smoking, diabetes, and high BMI. In this study, univariate analysis did not reveal statistical association of patient predictors for wound morbidity, including diabetes, BMI more than 30, smoking and age, skeletal chest wall defect size, and rigid and nonrigid reconstruction probably because the incidence of wound morbidity is so low. Weyant et al[6] reported a large series of chest wall resection and reconstruction with 19% (51/262) requiring soft tissue reconstruction, whereas in 81%, primary closure was achieved. However, wound complication and infection rate accounted for 7% (19/262), which occurred in the rigid reconstruction group without soft tissue reconstruction, but did not reach statistically significant when compared with the no/nonrigid reconstruction group. Forty-two percent (8/19) of these infected cases required removal of the prosthesis.[6]

Observations from previous published reports demonstrated the importance of the proximate collaboration between several disciplines in managing these patients; however, it underscores the occurrence of the wound morbidity even in the presence of soft tissue coverage for rigid reconstruction ranging from 9% to 25%,[3,7] whereas in other series, this relationship was not highlighted.[4,18] In our series, 52 of 71 (73%) of the patients required rigid reconstruction, whereas all patients required soft tissue reconstruction, with only 2 patients (2.8%) who had rigid reconstruction developed wound infection but did not require removal of the prosthesis. Although well-reported association of chemotherapy and radiotherapy with wound infection in the literature, none of the 2 patients whom experienced wound infection in this series required adjuvant treatment. We did observe that wound complications occurred more in patients with higher BMI as shown in these 2 patients with a BMI of 33 and 32 kg/m^2, respectively, in line with previously reported series; however, it was statistically insignificant. Less invasive muscle-sparing approach through a multidisciplinary team prevents damage of regional flaps, which traditionally would be damaged by conventional thoracic approaches and render them unusable. However, the controversial risk–benefit view reported in the literature has hindered its wide application in thoracic surgery.[22,23,26] Although the thoracic oncoplastic approach requires longer operative hours, it is associated with improved results in terms of radical resection with clear tumor free margins, decreased incidence of infection, and satisfactory functional and cosmetic outcome. There are limitations to this study being a single-institute experience with a low number of complications, which may indicate that the cohort is underpowered to detect association with risk factors and also the potential requirement of an objective statistical analysis comparing presurgery and postsurgery donor-site biomechanics. This study is driven to assess mainly wound morbidity at primary and donor sites; we believe that meticulous surgical planning through a standardized multidisciplinary thoracic oncoplastic approach is of paramount importance in devising a comprehensive and safe outcome to provide long-term versatility through minimizing wound complications.

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