Zagazig University Medical Journal
www.zumj.journals.ekb.eg
https://doi.org/10.21608/zumj.2024.234154.2873 Volume 30, Issue 4, July 2024
Manuscript ID ZUMJ-2311-3001
DOI 10.21608/ZUMJ.2023.247766.3001

Original Article

Chest Wall Reconstruction with Proline Mesh only or with Metallic Bar

Mohamed Ashraf Refat Abd Elmonsef*, Mostafa Abdel Mohsen Elnewehy, Abdallah Ibrahim Badr, Ahmed Mahmoud Ahmed Shafeek, Tamer Salem Mohamed Alawady

Department of Cardiothoracic surgery, Faculty of Medicine, Zagazig University, Egypt.

***Corresponding author:**
Mohamed Ashraf Refat Abd Elmonsef
Email:
mohashraf2244@gmail.com

Submit Date 10-11-2023
Accept Date 13-11-2023

ABSTRACT

Background: In recent decades, two prominent methods for chest wall reconstruction have gained prominence: the use of proline mesh only and the combination of proline mesh with a metallic Bar. This work aimed for evaluation of the comparative effectiveness of these two techniques, with a specific focus on their impact on wound infection rates and early postoperative outcomes.

Methods: This prospective cohort study was performed at the Cardio-thoracic Surgery Department at Zagazig University Hospitals on 18 patients with significant defects of the chest wall resulting from chest wall infection, post-traumatic injuries, or tumors requiring resection and subsequent reconstruction. The study involved two groups: Group A, Nine cases who underwent chest wall reconstruction using Proline Mesh only, and Group B, Nine cases who underwent chest wall reconstruction using combined Proline Mesh with a Metallic Bar.

Results: The mean operation time was almost similar between the two groups. Intraoperative blood loss specific surgical procedures, such as partial sternotomy, diaphragm resection, pericardium resection, abdominal wall reconstruction, number of ribs resected, and site location of surgeries, did not exhibit statistically significant differences between both groups. Group B had a slightly more extended postoperative hospital stay, which was approaching significance. Post-operative complications did not significantly differ between the groups.

Conclusions: Overall, we found no significant differences in patient characteristics, causes of admission, lesion characteristics, laboratory data, or most postoperative outcomes between the two groups. Our findings strongly advocate for adoption of Proline Mesh with Metallic Bar technique as highly effective and favorable choice in chest wall reconstruction.

Keywords: Chest Wall Reconstruction;Proline Mesh;Metallic Bar.

INTRODUCTION:

Reconstructing the chest wall is still a significant challenge in Thoracic Surgery. Surgical difficulties, chest infections, chest trauma, and post-traumatic deformity are the most common causes of thoracic deformities requiring reconstruction [1].

Repairing major chest wall defects requires a multi-step surgery using techniques and materials (flaps, omentoplasty, etc.), collectively called "complicated chest wall

reconstruction."[2] recent years have also seen the development of microvascular techniques and custom artificial substitutes.

There are factors beyond surgical difficulty that contribute to the complexity of chest wall repair. Nonetheless, certain complicated clinical conditions call for relatively easy methods to achieve closure of the defect, such as chest wall defects in patients with impaired immunity and healing following transplant surgeries. When possible, natural flaps and transposed omentum should be used to close the incision instead of artificial materials [3].

Defects more significant than 5 cm in diameter when four or more ribs are absent, and lung herniation and paradoxical motion of the chest wall are possible complications that necessitate chest wall reconstruction. Defects in the anterior or lateral chest wall are more likely to necessitate reconstruction. It is essential to evaluate the degree of function loss or cosmetic challenges, the availability of technical resources, and the acceptable risk of complications before proceeding with chest wall reconstruction surgery. Considering all these criteria, the surgeon and patient may decide that reconstruction is not worth the dangers and difficulties it could create [4].

We hypothesized that a better outcome of metallic bar and proline mesh could be attained compared to proline mesh only in chest wall reconstruction. Recently, two prominent methods for chest wall reconstruction have gained prominence: the use of Proline Mesh by itself and the combination of Proline Mesh with a Metallic Bar. This work aimed for evaluation of the comparative effectiveness of the two techniques: the use of Proline Mesh by itself and the combination of proline mesh with a Metallic bar, with a specific focus on their impact on wound infection rates and early postoperative outcome.

METHODS:

We conducted this prospective cohort study at the Cardio-thoracic Surgery Department at Zagazig University Hospitals from December 2022 to September 2023; all instances were considered for inclusion if they fulfilled the inclusion and exclusion criteria. During the study period (9 months), 2 cases/months, 18 patients were included as a comprehensive sample and divided into two groups, 9 cases in each group, and ethical approval and consent were taken from all patients for documentation.

We included 18 patients with significant defects of the chest wall resulting from chest wall infection, post-traumatic injuries, or tumors requiring resection and subsequent reconstruction. All Patients with chest wall defects less than 5cm in diameter or less than three ribs, or who had a history of asthma, frequent exacerbations, those with symptomatic or unstable cardiovascular (CV) illness specifically, those with a recent history of myocardial infarction; those who utilize supplementary oxygen for extended periods; those who take variable dosages of systemic steroids; or unstable or life-threatening dysrhythmia were excluded from the study.

After institutional review board approval of IRB (#9978/16-10-2022), written informed consent was obtained from all participants. The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Pre-operative preparation:

All patients were considered to:

Complete history taking including Age, sex, and occupation. General and local examination of the chest to detect the presence of chest wall mass, skin lesions, degree of asymmetry or asynchrony of chest expansion, and abnormal masses and the site of the lesion were documented. Radiographic assessment involving Chest X-ray and Computed tomography (CT) examinations. Pulmonary Function Tests (PFT) were done on all patients pre- and post-operative. Laboratory studies included a complete blood count (CBC), coagulation profile, kidney function test (KFT), and liver function test (LFT) as preparation for surgery.

Surgical maneuvers:

Patients were randomly assigned into two groups: Group (A): 9 cases underwent chest wall reconstruction using proline mesh only. Group (B): 9 cases who underwent chest wall

reconstruction using metallic bar and proline mesh.

In all patients, a targeted, lesion-specific, direct approach strategy was implemented. The patient was positioned in the lateral decubitus position, and the surgical area was draped to cover the patient's sternum and spine. The defect was reached by making a curvilinear incision in the chest wall. From the chest wall, full-thickness fasciocutaneous flaps were dissected and raised. The defect size was determined by measuring its height and width. A sternectomy was performed if necessary, and a partial sternectomy was described as resecting less than 90% of the sternum's longitudinal diameter. The number of ribs included was noted and documented. In patients with chest tumors, all invaded structures were resected.

In group (A): Above and below the tumors, we used unaffected intercostal spaces to access the thoracic cavity. Removing the malignancies and any nearby mediastinal structures simultaneously (En bloc resection) or the diaphragm was performed according to the extension of the tumor extension. A 2 mm thick proline mesh was stretched over the chest wall defect. The proline mesh was doubled and sutured to adjacent ribs and fascia to cover the chest wall defect. Direct closure of flaps was used to repair soft tissue depending on the defect's size and location (Figure 1A)

In group (B): After the resection, one or more moldable metallic plates were fixed to the remaining rib or clavicular stumps and the residual sternum, supporting the mesh and avoiding the anterior. For defects in the chest wall involving the ribs, on either side of the disused rib, metal bars were fixed. When posterior fixation of tumors in the posterolateral chest wall is not possible, a Z-shaped metal bar is fashioned and secured to the patient's upper and lower ribs. In sternotomies, the plates were applied between the bilateral rib or clavicular stumps in a saltire shape. In contrast, in partial longitudinal sternotomies, one or two parallel plates were fixed between the rib stumps and the residual sternum. Then, a tailored Proline mesh was anchored to the margins of the defect with non-absorbable sutures overlying the metallic bars (Figure 1 B and C).

Post-operative follow up:

Both study groups were followed up 3 and 6 months postoperatively through clinical and radiological evaluation for late detection of delayed outcomes. Data was collected concerning post-operative ICU admission: time of entry, monitoring of vital signs, mechanical ventilator requirement, time of discharge from the ICU, and total time of stay in the ICU. Early post-operative comprised wound infection and, sepsis, prosthesis complication. Any symptoms or signs of respiratory failure, Patient satisfaction, and postoperative stay in hospital.

STATISTICAL ANALYSIS:

SPSS 26.0 for Windows was used for data collection, tabulation, and statistical analysis (SPSS Inc., Chicago, IL, USA. Mean ± SD Range was used to represent quantitative data, whereas numbers and percentages were used to describe qualitative data. A T-test or Mann-Whitney U-test was used to compare quantitative data that was regularly distributed. In contrast, a chi-square test was used to examine qualitative data that was not normally distributed, and a Z-test for percentage was used to compare the outcome rate between the two groups.

RESULTS:

Group A had a mean age of 49.33 ± 16.76 years, while in Group B, it was 37.67 ± 12.13 years ($p = 0.1101$). The distribution of male and female patients in Group A was 5 (55.56%) and 4 (44.44%), respectively, whereas Group B had 3 (33.33%) male and 6 (66.67%) female patients ($p = 0.3724$). The body mass index (BMI) in Group A was 23.57 ± 1.67 kg/m², and in Group B, it was 23.64 ± 2.16 kg/m² ($p = 0.9329$). Furthermore, 4 (44.44%) patients in Group A were engaged in the specified occupation, compared to 6 (66.67%) in Group B ($p = 0.3724$) (Table 1).

In Group A, six patients (66.67%) were admitted for chest wall masses, while in Group B, five patients (55.56%) had a similar

admission reason, with a p-value of 0.6525. Traumatic chest wall injuries were reported in 1 patient (11.11%) in Group A and two patients (22.22%) in Group B, yielding a p-value of 0.5549. Additionally, infections were the cause of admission for two patients (22.22%) in both Group A and Group B, with a p-value exceeding 0.99, indicating no significant difference between the groups in this regard (Table 2)

The chest wall defect size, measured in centimeters, was found to be 9.89 ± 1.9 in Group A and 10.11 ± 1.62 in Group B, with a p-value of 0.7927, indicating no significant difference in defect size between the groups. Moreover, the number of ribs included in the lesions was 2.78 ± 0.97 in Group A and 2.44 ± 0.73in Group B, resulting in a p-value of 0.422, demonstrating no statistically significant distinction between the two study groups (Table 3).

In terms of preoperative Lab and investigation data concerning complete blood count (CBC), bilirubin levels, kidney and liver function tests, as well as coagulation tests between the two groups, did not show any statistically significant difference. In contrast, total proteins showed a significant difference with a p-value of 0.046* (Table 4).

No statistically significant differences were found in operation time and intraoperative blood loss between the two groups. When assessing specific surgical procedures, a partial sternotomy was performed in 0% of cases in Group A and 33.33% of patients in Group B (p = 0.0628), while diaphragm resection and pericardium resection exhibited no significant differences. However, abdominal wall reconstruction was performed in 0% of Group A and 22.22% of Group B cases, with a p-value of 0.1501. The number of ribs resected and the site location of the surgeries did not reveal any statistically significant differences between both groups (Table 5)

Non-statistically significant differences were found between the groups regarding post-operative ICU admission, with 100% of patients admitted to the ICU. The duration of post-operative ICU stay showed a minor difference, with Group B having a mean stay of 1.11 ± 0.33 days compared to 1 ± 0 day for Group A (p = 0.3322). The postoperative hospital stay in Group B was 5.22 ± 3.93 days, while Group A had a shorter stay of 2.78 ± 0.97 days, with a p-value of 0.0889. Post-operative complications, including wound infection, prosthesis complications, pneumonia, pleural effusion, chest wall complications, wound dehiscence, hematoma, and delayed wound healing, pulmonary function tests did not show any significant differences between the study groups (Table 6).

Table (1): Patients demographic data and general evaluations in both study groups

	Group A [Proline Mesh only] (N = 9)	Group B [Proline Mesh with Metallic Bar] (N = 9)	P. Value
Age (Years)	49.33 ± 16.76	37.67 ± 12.13	0.1101
Sex			
Male	5 (55.56%)	3 (33.33%)	0.3724
Female	4 (44.44%)	6 (66.67%)	0.3724
BMI (Kg/ m²)	23.57 ± 1.67	23.64 ± 2.16	0.9329
Occupation	4 (44.44%)	6 (66.67%)	0.3724

BMI: Body mass index

Table (2): Cause of admission in both study groups

	Group A (N = 9)	Group B (N = 9)	P. Value
Chest Wall Mass	6 (66.67%)	5 (55.56%)	0.6525
Traumatic Chest Wall Injuries	1 (11.11%)	2 (22.22%)	0.5549
Infection	2 (22.22%)	2 (22.22%)	>0.99

Table (3): Lesion Characteristics in both study groups

	Group A (N = 9)	Group B (N = 9)	P. Value
Chest wall defect size (Cm)	9.89 ± 1.9	10.11 ± 1.62	0.7927
Ribs included	2.78 ± 0.97	2.44 ± 0.73	0.422

Table (4): Preoperative Lab and investigation data in both study groups

	Group A (N = 9)	Group B (N = 9)	P. Value
CBC			
Hgb (g/dL)	14.56 ± 0.58	14.5 ± 0.49	0.8289
WBCs (cells/µL)	7184.67 ± 1773.75	7662.78 ± 1074.65	0.4991
RBCs (*10^6 cells/µL)	5.08 ± 0.37	4.99 ± 0.28	0.5737
PLT (*10^3 cells/µL)	317.11 ± 86.64	353.56 ± 77.94	0.3621
Liver Function Test			
Bilirubin (mg/dL)	0.76 ± 0.26	0.73 ± 0.3	0.8494
Total proteins (g/dL)	7.44 ± 0.57	6.88 ± 0.54	0.0463*
Albumin (g/dL)	4.33 ± 0.66	4.21 ± 0.66	0.6992
AST (U/L)	28.33 ± 5.94	24 ± 8.99	0.245
ALT (U/L)	32.44 ± 12.58	33.22 ± 12.34	0.8963
Kidney Function Test			
Urea (mg/dL)	11.56 ± 2.96	12.33 ± 2.69	0.5681
Creatinine (mg/dL)	0.93 ± 0.18	0.99 ± 0.16	0.4759
eGFR (mL/min/1.73 m²)	125.56 ± 19.19	114.67 ± 15.74	0.2067
Coagulation profile			
PT (s)	11.78 ± 0.83	12 ± 0.87	0.5868
PTT (s)	28.22 ± 2.68	31.33 ± 3.81	0.0623
Bleeding time (min.)	5.67 ± 2.92	7.22 ± 1.92	0.2001
Pulmonary function test			
FEV1	2.78 ± 0.97	2.44 ± 0.73	0.422

CBC: Complete blood count, Hgb: Hemoglobin, WBCs: white blood cells, RBCs: Red blood cells, PLT: Platelets, AST: aspartate aminotransferase, ALT: Alanine transaminase, eGFR: estimated glomerular filtration rate, PT; Prothrombin time, PTT: partial thromboplastin time, FEV1: forced expiratory volume in 1 second

Table (5): Operation Data in both study groups

	Group A (N = 9)	Group B (N = 9)	P. Value
Operation time (Hr)	4 ± 0.87	4 ± 1.22	>0.99
Intra operative blood loss (ml)	397.11 ± 103.63	458.33 ± 143.66	0.3152
Partial sternotomies	0 (0%)	3 (33.33%)	0.0628
Diaphragm resection	3 (33.33%)	3 (33.33%)	>0.99
Pericardium resection	2 (22.22%)	2 (22.22%)	>0.99
Abdominal wall reconstruction	0 (0%)	2 (22.22%)	0.1501
Number of ribs resected	5.22 ± 0.67	4.78 ± 0.83	0.2295
Site location			
Anterior	4 (44.44%)	5 (55.56%)	0.6607
Anterior-lateral	4 (44.44%)	2 (22.22%)	0.3464
Posterior-lateral	3 (33.33%)	2 (22.22%)	0.6239

Table (6): Post operative evaluation in both study groups

	Group A (N = 9)	Group B (N = 9)	P. Value
Post operative ICU admission	9 (100%)	9 (100%)	>0.99
Post operative ICU stay (Day)	1 ± 0	1.11 ± 0.33	0.3322
Postoperative stay in hospital (Day)	2.78 ± 0.97	5.22 ± 3.93	0.0889
Post operative complications			
Wound infection	3 (33.33%)	3 (33.33%)	>0.99
Prothesis complication	2 (22.22%)	0 (0%)	0.1501
Pneumonia	2 (22.22%)	1 (11.11%)	0.5549
Pleural effusion	2 (22.22%)	1 (11.11%)	0.5549
Chest wall complications	1 (11.11%)	0 (0%)	0.3322
Wound dehiscence	0 (0%)	1 (11.11%)	0.3322
Hematoma	1 (11.11%)	2 (22.22%)	0.5549
Delayed wound healing	1 (11.11%)	2 (22.22%)	0.5549
Pulmonary function test			
FEV1	2.67 ± 0.95	2.32 ± 0.71	0.422

FEV1: forced expiratory volume in 1 second

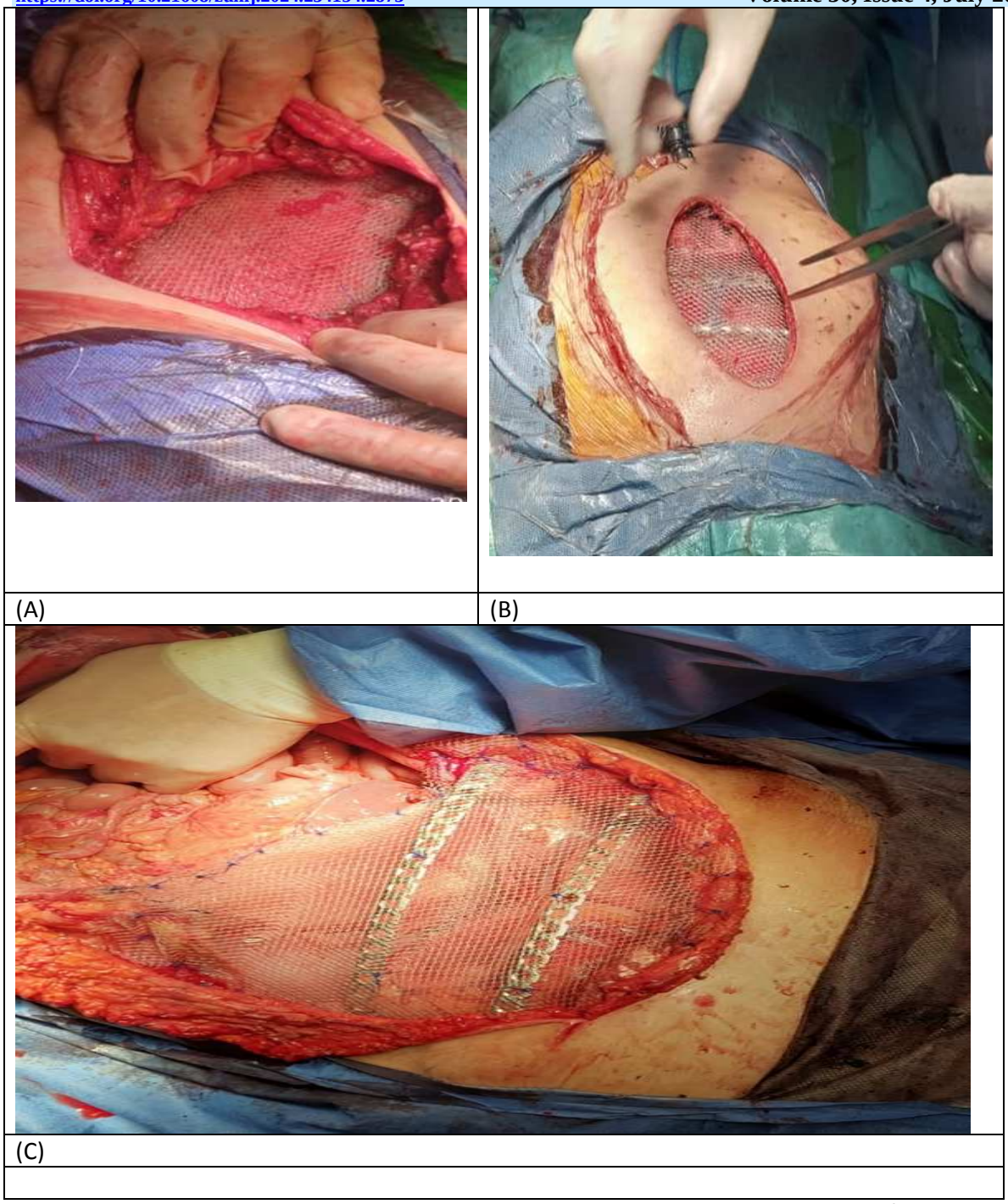

Figure 1: A: Chest wall reconstruction by proline mesh (Group A), B: suturing of proline mesh above metallic bar in (Group B), C: left chest wall resection and reconstruction with partial sternotomy using metallic bar and proline mesh in (Group B).

DISCUSSION:

Chest wall reconstruction is a vital aspect of thoracic surgery, addressing various clinical scenarios and challenges. This surgical discipline is employed to restore structural integrity and functionality to the chest wall in cases involving defects resulting from multiple factors, including lung cancer resection, chest wall infection, traumatic injuries, and postoperative complications. Selecting an optimal reconstruction technique is pivotal in achieving successful outcomes

while minimizing complications. In recent years, two prominent methods have emerged for chest wall reconstruction: the use of Proline Mesh alone and the combination of Proline Mesh with a Metallic Bar [5].

The choice between Proline Mesh alone and Proline Mesh with a Metallic Bar represents a critical decision in chest wall reconstruction. Proline Mesh, a synthetic material, provides structural support and facilitates tissue ingrowth while incorporating a Metallic Bar offers additional rigidity [6].

Regarding demographic data, Group A had a mean age of 49.33 years, while Group B had a mean age of 37.67 years, and the difference in age between the two groups was not statistically significant ($p = 0.1101$). The relatively higher age of chest wall reconstruction patients is primarily due to the prevalence of age-related conditions such as cancer and trauma, the cumulative effects of aging on chest structures, delayed diagnosis in older individuals, lifestyle and environmental factors, the presence of multiple comorbidities, and considerations of surgical risk, which collectively contribute to the more senior age profile seen in this patient population [7]. Our results were consistent with the findings of Schroeder-Finckh et al. [8], whose study on anterior chest wall reconstruction using polypropylene mesh also revealed a significantly older patient population; they operated on a group consisting of 15 males and 19 females, with a median age of 70.5 years

Regarding gender distribution, Group A had five male participants (55.56%) and four female participants (44.44%), while Group B had three male participants (33.33%) and six female participants (66.67%). These findings were comparable to the study conducted by Mohamed and Helmy [8], where they focused on chest wall reconstruction with a methyl-methacrylate sandwich after the resection of large chest wall tumors. In their study, males accounted for 73.3% of the patients (n=22), and the median age was 50 years, ranging from 20 to 75 years. While there was a slightly older age in Group A in our study, the overall age range in both studies appears to overlap. The gender distribution differences between our study groups and Mohamed et al.'s study [9]might reflect variations in patient populations, surgical indications, or regional demographics.

In our study, the most predominant cause of admission in both Group A (Proline Mesh only) and Group B (Proline Mesh with Metallic Bar) was "Chest Wall Mass." In Group A, 6 out of 9 patients (66.67%) were admitted due to a chest wall mass, while in Group B, 5 out of 9 patients (55.56%) had the exact cause for admission. For "Traumatic Chest Wall Injuries," 1 patient (11.11%) in Group A and two patients (22.22%) in Group B were admitted, and there was no statistically significant difference between the two groups ($p = 0.5549$). "Infection" was the cause of admission for two patients (22.22%) in both Group A and Group B, and the p-value was greater than 0.99, indicating no significant difference.

Chest Wall Masses can originate from various sources, including tumors, infections, inflammatory processes, or other underlying pathologies. Tumors are a significant type of Chest Wall mass and can be benign or malignant. Malignant tumors are cancerous and can infiltrate neighboring tissues or metastasize to other parts of the body, while benign tumors do not. Breast cancer, lung cancer, sarcomas, and other soft tissue tumors are all examples of common malignancies that can affect the chest wall. These tumors may arise within the chest wall or originate from adjacent structures and extend into the chest wall [10].

Our results were consistent with Colella et al. [11], who reported that benign malignancies were the primary indications for chest wall reconstruction (neurofibromas, angiomyolipoma, and desmoid tumor) as well as malignant tumors (lung cancer, sarcoma, breast cancer, metastases, and cartilage tumors as well as mediastinal tumors and melanoma).

In our study, the mean chest wall defect size was 9.89 ± 1.9 cm in Group A (Proline Mesh only) and 10.11 ± 1.62 cm in Group B (Proline Mesh with Metallic Bar),

demonstrating no statistically significant difference (p = 0.7927). Additionally, the number of ribs included in the defects was similar, with 2.78 ± 0.97 ribs in Group A and 2.44 ± 0.73 ribs in Group B (p = 0.422). The size of the chest wall defect and the number of ribs included did not differ significantly between the two groups, indicating similar lesion characteristics.

In the study by Weyant et al. [12], the median defect size was substantially larger, at 80 cm^2, with a wide range from 2.7 cm^2 to 1,200 cm^2. This data suggests that chest wall defects can vary significantly in size, highlighting the heterogeneity of cases that require chest wall resection and reconstruction. Furthermore, the median number of ribs resected in Weyant et al. [12] study was 3, ranging from 1 to 8. This underscores the complexity of chest wall surgeries, as the extent of rib resection can vary widely depending on the specific case.

The observation of slightly higher blood loss in Proline Mesh with Metallic Bar patients can be explained by several potential causes. Incorporating a metallic bar in the reconstruction procedure (Group B) may necessitate more extensive dissection and manipulation of tissues to accommodate the bar's placement and fixation. This increased tissue manipulation can result in more significant vascular injury and subsequent blood loss. Additionally, the metallic bar may contact blood vessels during placement, potentially causing minor bleeding. In contrast, Proline Mesh-only procedures (Group A) may involve less tissue manipulation. They may be associated with fewer contact points with blood vessels, potentially leading to lower blood loss. Surgeon experience and technique also play a role, as more experienced surgeons may minimize tissue trauma and bleeding during the procedure. Nonetheless, these differences in blood loss, while slight, underscore the importance of careful intraoperative monitoring and meticulous surgical technique to manage and minimize blood loss during chest wall reconstruction surgeries [13].

In our study, both groups had similar post-operative ICU admission rates, with 100% of patients admitted. The duration of post-operative ICU stay showed a minor difference but was not statistically significant. Group B had a slightly more extended postoperative hospital stay, which was approaching significance. Post-operative complications did not significantly differ between the groups. Also, as was previously documented, there was a change in pulmonary function test results, namely FEV1, between the pre-and post-operative periods. This may be attributed to the CW fibrosis-induced changes in thoracic stability, loss of intercostal muscles, and rise in restrictive ventilatory patterns, all of which disrupt normal respiratory biomechanics. Despite these functional effects, data showed no statistical difference in pulmonary function tests before and after surgery.

In contrast, Schroeder-Finckh et al. [8] studied anterior chest wall reconstruction using polypropylene mesh. Their analysis revealed a mean percentage difference of 11.1%, indicating some variability in outcomes among patients, ranging from 0.3% to 44.4%. Notably, in one case, a wound infection with a positive culture necessitated surgical revision, including the removal of the polypropylene mesh. This underlines the importance of vigilant postoperative care and the potential for complications in chest wall reconstruction procedures utilizing polypropylene mesh.

Additionally, Schroeder-Finckh et al. [8], According to a 2021 study, polypropylene mesh chest wall reconstruction had a low complication rate that could be attributed to the mesh itself. Polypropylene mesh was used to reconstruct 138 of 202 chest wall resections for eight years. In 12.3 percent of patients, pneumonia was the most prevalent complication after surgery. In 5.7% of patients, a wound seroma developed, requiring the placement of a Redon suction drain. Three patients (2.1%) developed a microbiologically verified local wound infection, which removed reconstruction material in one case. Two deaths occurred after surgery, contributing to a 30-day mortality rate of 1.4%. Overall, these findings

supported using polypropylene mesh for chest wall restoration as a feasible procedure with manageable risks and satisfactory outcomes.

Compared to our results, Weyant et al. [12] reported a higher overall complications rate, with a significant proportion of patients experiencing respiratory complications, leading to mortality in some cases.

Our results did not agree with a study by Clermidy et al. [14] that looked at the correlation between long-term survival and chest wall (CW) tumor resections with titanium reconstruction. They found 87 people who had CW tumor resections followed by titanium reconstruction; after weeding out outliers, they could include 68 people in the study. Overall survival rates at 1, 3, and 5 years were reported to be 82.3%, 61.4%, and 57.3%, respectively, which is encouraging. At the same time points, the rates of disease-free survival were 67.6%, 57.3%, and 52.6%. Titanium reconstructive devices were found to be a safe and dependable option, with minimal morbidity and implant-related complication rates and positive oncological results. Notably, no titanium allergies were detected, and 24% of patients reported having chronic chest pain that persisted for more than three months following surgery and required daily medicines. These findings suggest that titanium reconstruction for CW tumor resections can lead to favorable long-term survival rates but may be associated with specific postoperative challenges such as infection and chronic pain.

Limitations:

Several limitations should be considered when interpreting the findings of our study. Firstly, the relatively small sample size of both Proline Mesh only patients and Proline Mesh with Metallic Bar patients may limit the generalizability of our results to a broader population. Additionally, the retrospective nature of the study design could introduce selection bias and potential inaccuracies in data collection. Furthermore, the short follow-up duration may not capture long-term outcomes and complications associated with chest wall reconstruction. Finally, the study did not investigate potential variations in surgical techniques or the experience of the surgical teams, which could influence outcomes. These limitations highlight the need for larger, prospective studies with longer follow-up periods and more comprehensive data collection to further elucidate the optimal approach to chest wall reconstruction.

CONCLUSIONS:

In conclusion, our study has provided valuable insights into these surgical approaches. As we found no significant differences in patient characteristics, causes of admission, lesion characteristics, laboratory data, or most post-operative outcomes between the two groups. However, it is worth noting that Proline Mesh with Metallic Bar patients exhibited a trend towards a slightly longer postoperative hospital stay and a slightly higher prevalence of Intra operative blood loss with no significant difference. On the other hand, Proline Mesh with Metallic Bar provide less prothesis complication and more rigidity, stability and more cosmetic of chest wall so it preferable specially in large defect and female patient. Overall, these findings strongly advocate for adoption of Proline Mesh with Metallic Bar technique as highly effective and favorable choice in chest wall reconstruction.

Declaration of interest : The authors report no conflicts of interest. The authors along are responsible for the content and writing of the paper.

Funding information : None declared.

REFERENCES:

1. **Seder CW, Rocco G**. Chest wall reconstruction after extended resection. *J Thorac Dis*. 2016;8(11):863-71.
2. **Botianu PVH**. Current indications for the intrathoracic transposition of the omentum. *J Cardiothorac Surg*. 2019;14(1):103.
3. **Merritt RE**. Chest Wall Reconstruction Without Prosthetic Material. *Thorac Surg Clin*. 2017;27(2):165-9.
4. **Smelt J, Pontiki A, Jahangiri M, Rhode K, Nair A, Bille A.** Three-Dimensional Printing for Chest Wall Reconstruction in Thoracic Surgery: Building on Experience. *Thorac Cardiovasc Surg*. 2020;68(4):352-6.
5. **Wang L, Yan X, Zhao J, Chen C, Chen C, Chen J, et al.** Expert consensus on resection of chest wall

tumors and chest wall reconstruction. *Transl Lung Cancer Res*. 2021;10(11):4057-83.

6. **Isaac KV, Elzinga K, Buchel EW**. The Best of Chest Wall Reconstruction: Principles and Clinical Application for Complex Oncologic and Sternal Defects. *Plast Reconstr Surg*. 2022;149(3):547-62.
7. **Dai Z, Maihemuti M, Sun Y, Jiang R**. Resection and reconstruction of huge tumors in the chest wall. *J Cardiothorac Surg*. 2022;17(1):116.
8. **Schroeder-Finckh A, Lopez-Pastorini A, Galetin T, Defosse J, Stoelben E, Koryllos A.** Anterior Chest Wall Reconstruction Using Polypropylene Mesh: A Retrospective Study. *Thorac Cardiovasc Surg*. 2020;68(4):341-51.
9. **Mohamed EEH, Helmy AA**. Chest wall reconstruction with a methyl-methacrylate sandwich after resection of large chest wall tumors: Single center experience. *Sohag Med J* (2021) 25(1):88–95.
10. **Bajaj T, Aboeed A.** Chest Wall Tumors. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 5, 2022.
11. **Colella S, Brandimarte A, Marra R, Marinari S, D'Incecco A**, Di Genesio Pagliuca M,et al. Chest wall reconstruction in benign and malignant tumors with non-rigid materials: An overview. *Front Surg*. 2022; 9:976463.
12. **Weyant MJ, Bains MS, Venkatraman E, Downey RJ, Park BJ, Flores RM, et al**. Results of chest wall resection and reconstruction with and without rigid prosthesis. *Ann Thorac Surg*. 2006;81(1):279-85.
13. **Sanna S, Brandolini J, Pardolesi A, Argnani D, Mengozzi M, Dell'Amore A, et al**. Materials and techniques in chest wall reconstruction: a review. *J Vis Surg*. 2017; 3:95.
14. **Clermidy H, Fadel G, De Lemos A, Pradere P, Mitilian D, Girault A, et al.** Long-term outcomes after chest wall resection and repair with titanium bars and sternal plates. *Front Surg*. 2022; 9:950177.

Citation :

Abd Elmonsef, M., Elnewehy, M., Badr, A., Shafeek, A., Alawady, T. Chest Wall Reconstruction with Proline Mesh only or with Metallic Bar. *Zagazig University Medical Journal*, 2024; (2321-2331): -. doi: 10.21608/zumj.2023.247766.3001