Factors Affecting Complication Rates for Chest Wall Tumor Excision with Plastic Reconstruction

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Background

The primary strategy employed in the management of chest wall tumors involves a procedure known as chest wall resection. This procedure involves surgically removing the tumor and then restoring the chest wall's structure and function using techniques like grafts, implants, or tissue flaps; aiming to effectively eliminate the tumor while ensuring the chest wall's stability and normal respiratory function, with either curative or palliative intent.[1] Despite the progress made in the surgical methodologies employed, post-operative complications following chest wall resection remain prevalent, with documented incidence rates ranging from 24% to 46% of patients.[2]

While perioperative mortality is low, common early post-operative complications include hematomas and seromas, wound infection and dehiscence, respiratory difficulties from pleural effusions and pneumonia, and mesh failure due to poor technique or improper selection of material.[3] It has been noted in the literature that the main risk factors for complications are size of defect, age, and concomitant lung resection.[2] However, there persists a notable gap in our understanding of the variations in patient demographics that might contribute to the development of complications.

Research Objectives

The objective of this study was to elucidate the factors underlying differences in rate of seroma, hematoma, infection, and dehiscence among a diverse group of patients with various comorbidities.

Methods

The All of Us database was queried for patients who underwent excision of a chest wall tumor with plastic reconstruction, with or without mediastinal lymphadenectomy. Dataset v7 was utilized to extract race, ethnicity, gender, age, and household income (HHI) for each patient. The number of patients who developed common complications within 30 days of chest wall reconstruction (infection, dehiscence, hematoma, and seroma) was also extracted. Finally, rates of comorbidities including hypertension (HTN), type II diabetes mellitus (DM2), congestive heart failure (CHF), coronary artery disease (CAD), and renal failure among these patients were determined. Data was analyzed by calculating incidences, odds ratios, and confidence intervals. Patient data cannot be reported for groups with a count of 20 or less to protect the privacy of participants.

Income bracket cutoffs were chosen in relation to the federal poverty level (FPL) for a family of three ($24,860).[12] Patients at less than 200% of the poverty line (< $50,000) were considered low-income, patients at 200-400% ($50,000-100,000) were considered mid-income, and patients above 400% (> $100,000) were considered high-income.[12,13]
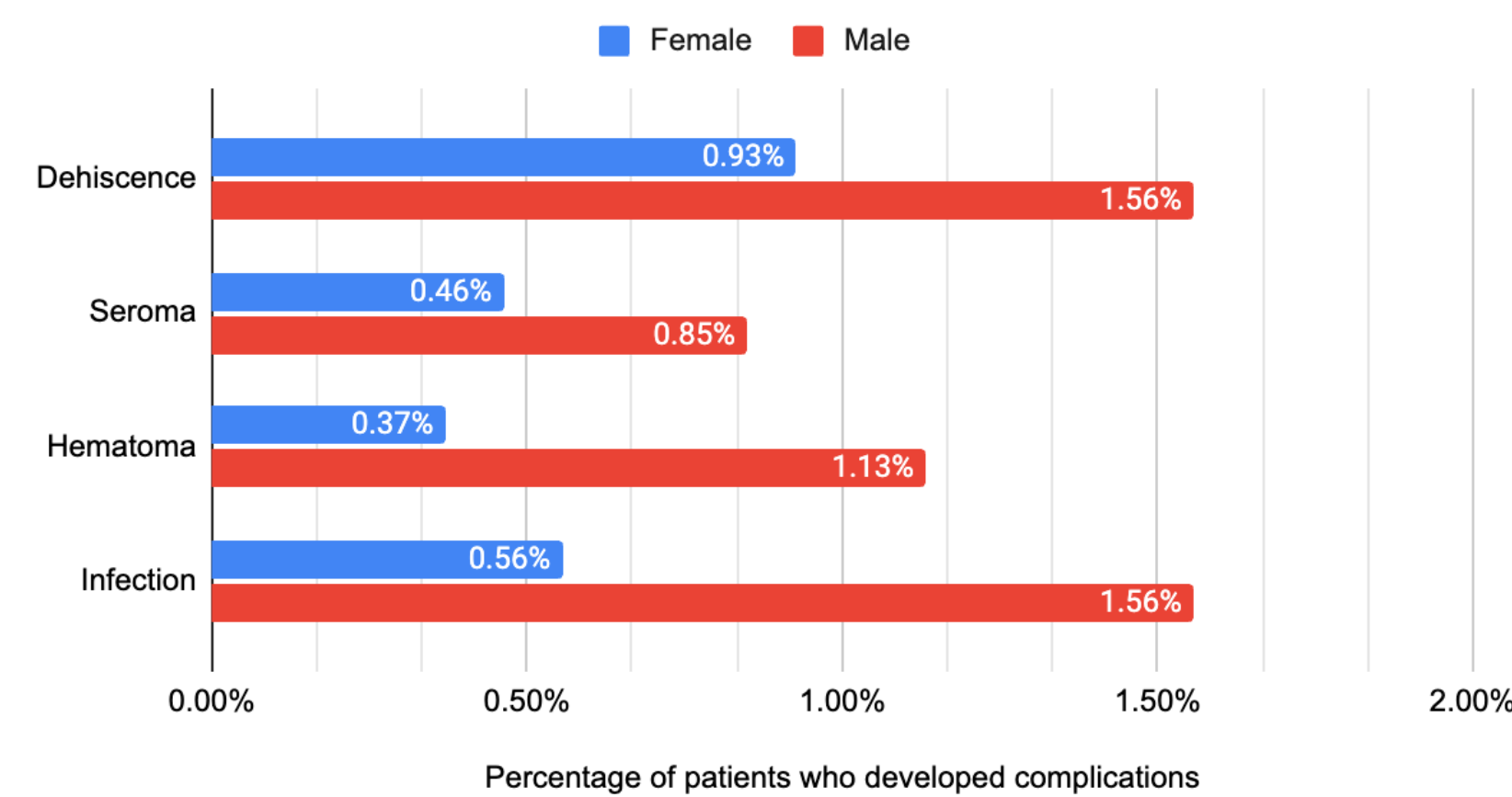
Complications by Gender

Figure 1. Gender Differences in Patients who Developed Complications
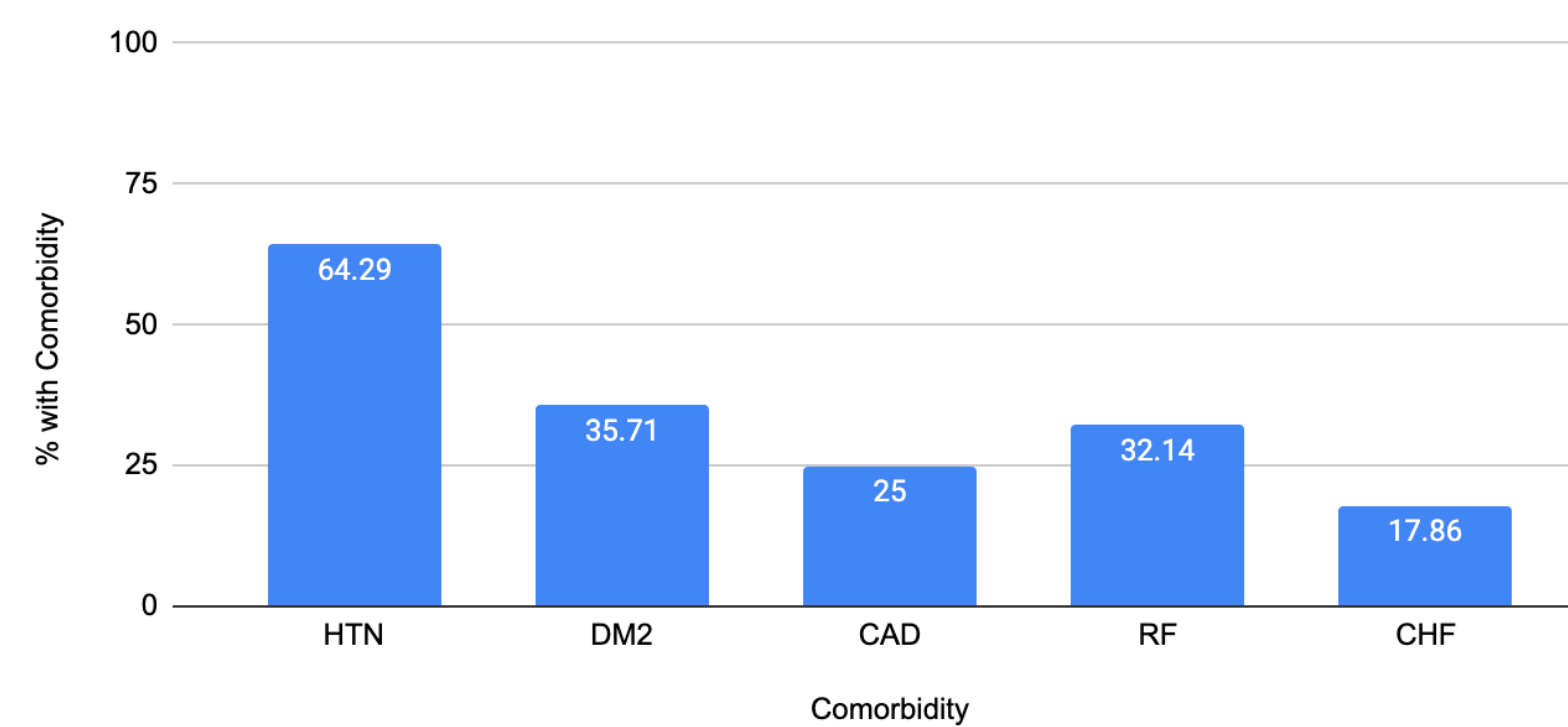
Pre-existing Comorbidities

Figure 2. Percentage of Patients with Complications who had Pre-existing Comorbidities

Results

A total of 1,832 patients who underwent excision of a chest wall tumor with plastic reconstruction with or without mediastinal lymphadenectomy were included, of which 18.7% were white, 23.8% were black, 3.4% were Asian, mixed, or other, and 54% did not answer.

Among patients who experienced complications, 3.6% were Asian, 53.6% were Black, and 42.9% were White. There was no significant difference in proportion of patients developing complications in White vs. non-White patients (OR = 1.09, 95% CI 0.51-2.34). Male patients were significantly more likely to develop complications than patients who self-identified as female (OR = 2.26, 95% CI 1.35-3.81) (Figure 1). There was no significant difference in development of complications in high-income patients compared with low- and mid-income patients (OR 0.74, CI 0.31-1.75).

Among all patients who received chest wall reconstruction surgery, 60.7% had HTN, 30.9% had DM2, 16.3% had CAD, 20.6% had renal failure, and 7.6% had CHF. Patients with comorbid renal failure (OR 1.82, CI 1.03-3.03) or congestive heart failure (OR 2.65, CI 1.31-5.36) were more likely to develop complications compared to patients without these comorbidities (Figure 2). There were no significant differences in complication rates based on comorbid HTN, DM2, or CAD.

Conclusions

This study elucidates many factors influencing post-operative complications following chest wall tumor excision with plastic reconstruction. While patient race and income were not strongly associated with complications, gender differences, and the presence of certain comorbidities emerged as significant predictors. This highlights the importance of personalized risk assessment to enhance safety and efficacy.

References

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