Impact of Gender Outcomes in Craniomaxillofacial Trauma patients: A Retrospective Analysis

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Introduction

Craniomaxillofacial (CMF) trauma presents significant challenges in healthcare due to its complex nature and the critical anatomical regions affected. In Puerto Rico, understanding the nuances of how gender differences affect trauma outcomes is crucial for developing effective, personalized medical care. By investigating local trends and specific outcomes, our study aims to address gaps in the existing literature by examining gender disparities in CMF fractures, hospital stays, and acute injury severity scores (GCS/RTS) in Puerto Rico. We hypothesize that gender plays a significant role in determining these outcomes.

Methods and Materials

This project was approved by the Institutional Review Board of the University of Puerto Rico Medical Sciences Campus. Given the retrospective and anonymized nature of the dataset, the requirement for informed consent was waived. This study adhered to the STROBE guidelines for observational studies.

Study Design and Data Source:
This was a retrospective secondary analysis of a de-identified database originally collected for a study on the epidemiology of CMF. The dataset included 1,161 patients treated for CMF trauma at Administración de Servicios Médicos de Puerto Rico (ASEM) from January 2018 to October 2022.

Study Participants:
The analysis included patients aged ≥18 years who presented with CMF trauma during the study period. Patients missing key data on sex, trauma scores (GCS or RTS), or discharge status were excluded. Participants were divided into two groups based on sex: male and female.

Variables:
Variables extracted for analysis included demographic information and mechanisms of injury that were further categorized into pedestrian-related accidents, car-related accidents, other motor vehicle accidents (MVAs), gunshots, assaults, falls, and other causes (i.e., animal attacks). The primary outcome was in-hospital mortality stratified by sex. Secondary outcomes included differences in trauma severity (as measured by GCS and RTS scores) and hospital stay duration between males and females.

Statistical Analysis:
Categorical variables were summarized as frequencies and percentages, while continuous variables were summarized as means with standard deviations. Comparisons between groups were performed using Chi-square tests for categorical variables and independent t-tests for continuous variables. A two-tailed p-value of less than 0.05 was considered statistically significant. All statistical analyses were performed using IBM SPSS Statistics, v 29.0. Bivariate analyses, including Pearson Chi-Square tests and t-tests, were performed to compare outcomes between male and female patients and to determine statistical significance, with an alpha level of p < 0.05.

Results

Table 1. Sociodemographic characteristics and comorbidities of patients who presented with CMF trauma at the Medical Center of Puerto Rico from January 2018 to October 2022.

	Male	Female
Participants	960	201
Age (avg. ± SD)	40.7 ± 18.9	39.3 ± 21.2
*Medicare n (%)	462 (48%)	81 (40.3%)
Length of stay	9 days	7 days
DMT2 n (%)	92 (9.6%)	27 (13.4%)
HTN n (%)	172 (17.9%)	46 (22.9%)
COPD n (%)	9 (0.9%)	1 (0.5%)
CKD n (%)	9 (0.9%)	2 (1.0%)

*p<0.05

Graph 1. Etiology of CMF trauma classified by sex at the Medical Center of Puerto Rico from January 2018 to October 2022.
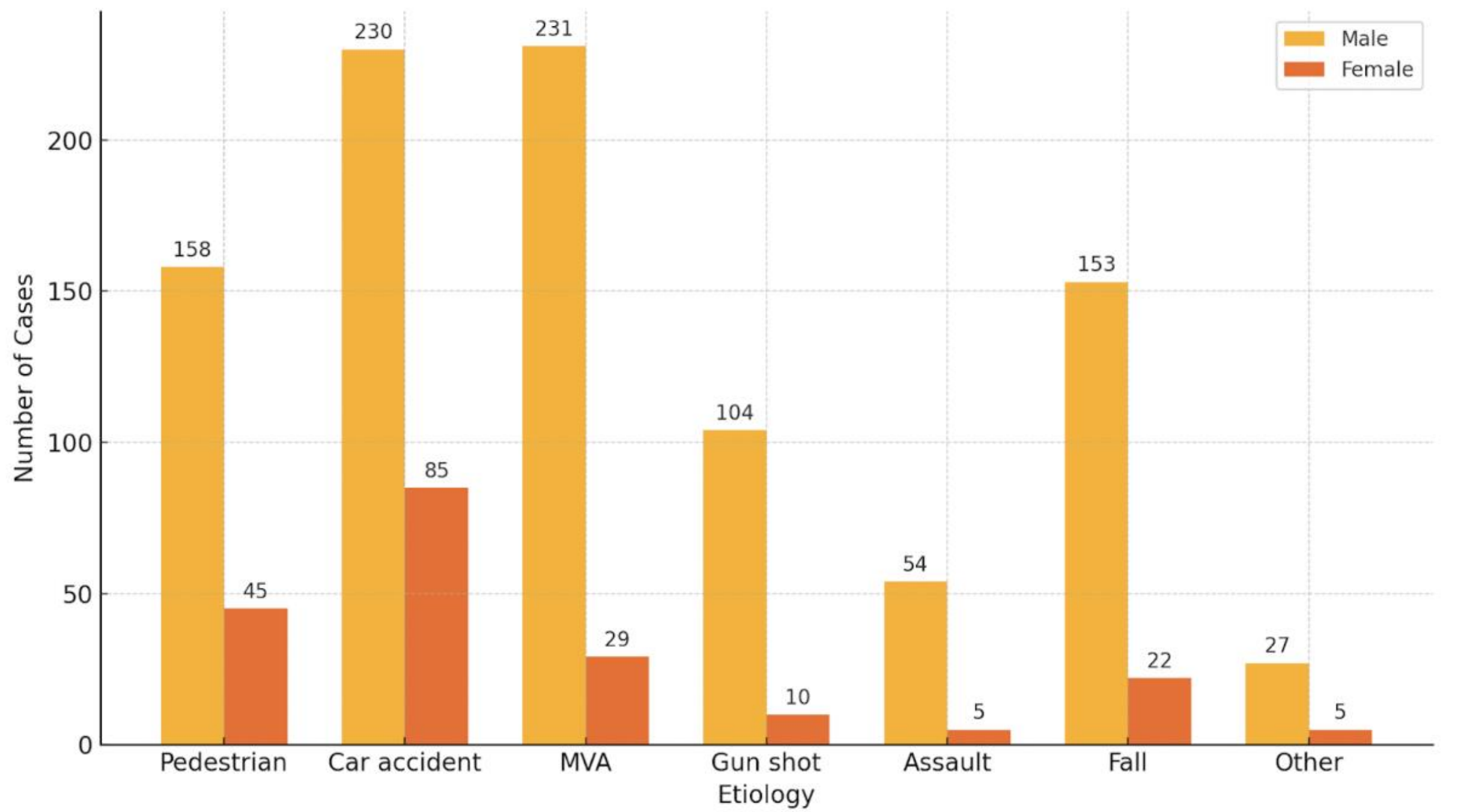

Table 2. Mortality rates classified by sex in patients with CMF trauma at the Medical Center of Puerto Rico from January 2018 to October 2022.

	Male n (%)	Female n (%)	p value
Alive	838 (87.3%)	188 (93.5%)	
Dead	122 (12.7%)	13 (6.5%)	
Total	**960 (100%)**	**201 (100%)**	**0.012**

Table 3. Independent t-Test comparing GCS and RTS means by sex classification.

	t-test	p-value	CI
GCS	-2.840	0.005	-1.413, -0.0258
RTS	-2.015	0.044	-0.378, -0.004

Discussion

Previous studies have consistently shown significant gender disparities in trauma outcomes. For instance, Lee et al. (2020) reported higher mortality rates in males following severe trauma, due to the protective anti-inflammatory effects of estrogen, which positively influence female's cardiovascular health and ability to recover from trauma. Our findings align with these studies, showing a 6.5% mortality rate in females versus a 12.7% rate in males, reaching statistical significance (p = 0.012). We concluded that the predominant cause of trauma among males was motor vehicle accidents, non-car related, while females were more likely to experience trauma from car accidents. This discrepancy could be due to the differing age profiles of study populations and variations in cultural or regional practices. This study's focus concerning GCS and RTS trauma scores found that there is a significant difference between genders, showing a GCS with a p value at 0.005 and RTS with a p value at 0.044. This study contributes to the growing body of knowledge on gender differences in CMF trauma by providing specific data from Puerto Rico, a region previously underrepresented in such research. The findings highlight significant differences in etiology, recovery, and mortality rates between male and female patients, emphasizing the need for gender-sensitive approaches in trauma care.

Limitations and future recommendations

Limitations of this study include a sample imbalance between males (960) and females (201), highlighting the need for larger and more balanced studies to enhance the robustness of the findings. Additionally, results are specific to Puerto Rican demographics and may not universally apply due to cultural and socioeconomic variations. Further research is essential to thoroughly explore the complex interactions of gender-specific factors in trauma care across diverse populations.

References

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