International Surgical Week
The World's Congress of Surgery
isw2024.org
Kuala Lumpur, Malaysia
25-29 August 2024

Utilizing The Miller Payne Score as A Pathological Respond Prediction to Neoadjuvant Chemotherapy in HER2-positive & Triple-negative Breast Cancer.

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Introduction

Neoadjuvant chemotherapy (NAC) has significantly increased the feasibility of breast-conserving surgery for breast cancer patients. This study aims to assess the effectiveness of NAC in treating Triple Negative Breast Cancer (TNBC) and HER2-positive breast cancer within our local population. To evaluate the extent of tumour reduction, we employed the Miller-Payne grading system (refer to table below). By examining the histopathological changes in resected tumour specimens, we sought to determine the correlation between NAC efficacy and specific breast cancer subtypes.

Miller-Payne	Histopathologic Findings
Grade 1	No change or some alteration to individual malignant cells, but no reduction in overall cellularity
Grade 2	A minor loss of tumour cells, but overall cellularity still high; >30% loss
Grade 3	Between an estimated 30% and 90% reduction in tumour cells.
Grade 4	A marked disappearance of tumour cells such that only small clusters or widely dispersed individual cells remain; > 90% loss of tumour cells.
Grade 5	No malignant cells identifiable in sections from the site of the tumour, only vascular fibroelastotic stroma remains, often containing macrophages. However, ductal carcinoma in situ may be present.

Materials & Methods

Data analysis involving breast cancer patients confirmed pathologically that underwent surgery in Hospital Selayang and neoadjuvant chemotherapy in oncology department, Hospital Kuala Lumpur. Retrospective sampling method was done using BHis which is a computerised-generated database from January 2022 until December 2023. All patients were given standard chemotherapy regimens. Demographic data and Miller Payne Score were analysed in TNBC and HER2 positive group.

Results

A total of 43 patients received neoadjuvant chemotherapy in this study. The bar chart illustrates the distribution of four breast cancer subtypes; HER2-negative HR-positive, TNBC, HER2-positive HR-positive, and HER2-positive HR-negative, across varying levels of disease severity based on Miller Payne Grade Scores. HER2-positive HR-positive breast cancer emerged as the most prevalent subtype, while HER2-positive HR-negative was less common. TNBC and HER2-negative HR-positive subtypes exhibited relatively even distribution across disease stages. Intriguingly, the data hints at a potential correlation between HER2 positivity and more advanced disease, particularly for the HR-positive subtype. These findings showed different figures of ascendancy in tumour cell reduction in post neoadjuvant chemotherapy patient where tumour cell reduction >90% were seen highest in HER2 positive. Mostly, estimated 30% and 90% reduction in tumour cell seen in HER2.
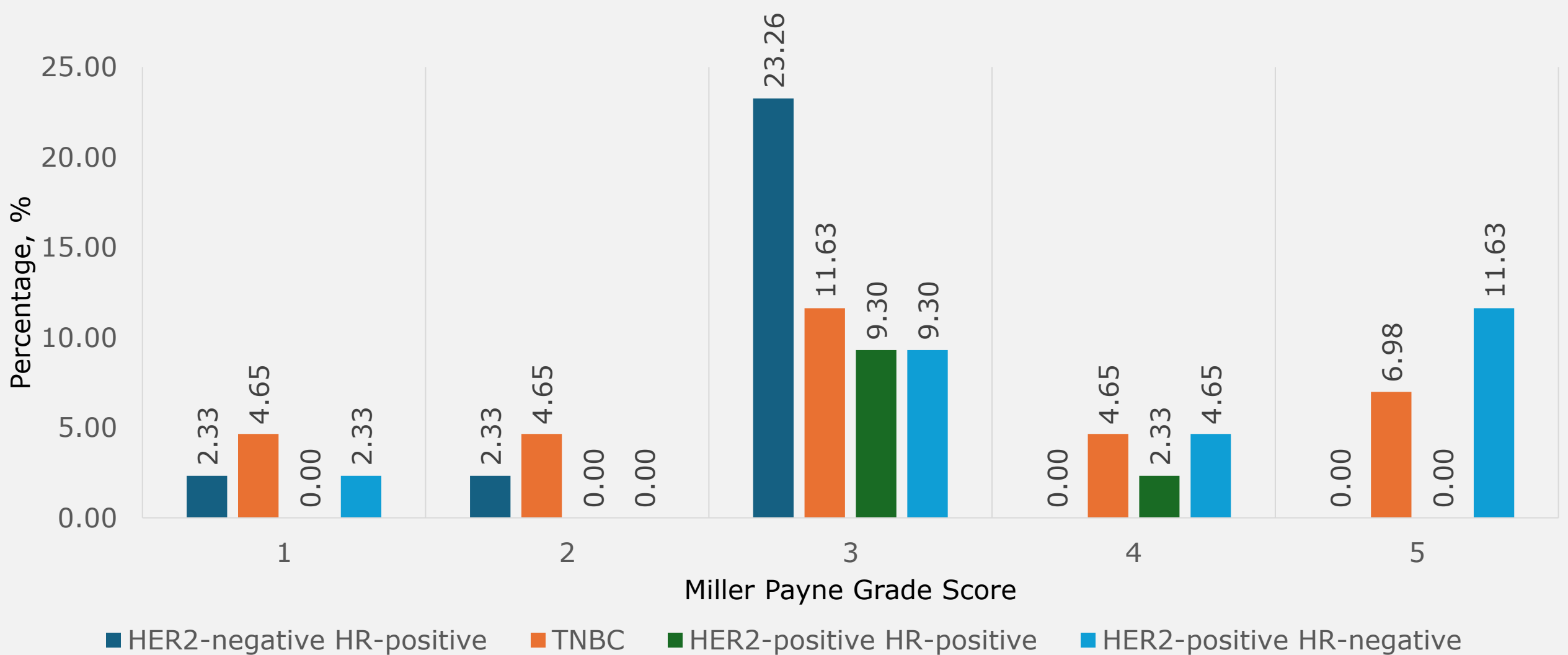
Miller Payne Grade Score (%)

Diagram 1. The bar chart illustrates the distribution of **HER2-negative HR-positive, TNBC, HER2-positive HR-positive and HER2-positive HR-negative** breast cancer patients across five Miller-Payne grade scores.

Conclusion

The findings of this study suggest that HER2-positive breast cancer patients may significantly benefit from neoadjuvant chemotherapy due to their higher likelihood of achieving a complete pathological response. Additionally, the Miller Payne Score demonstrates potential as a prognostic factor for predicting overall and disease-free survival following neoadjuvant treatment.
However, the relatively small sample size of this study necessitates further investigation with a larger patient cohort to solidify these findings. Future research should focus on exploring the association between Miller Payne Grade Score and patient outcomes, as well as delving into the molecular characteristics of different breast cancer subtypes to elucidate the underlying mechanisms driving their distinct clinical behaviours.