Immature platelet fraction in ITP is inversely proportional to platelet counts during thrombocytopenic episodes

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INTRODUCTION

Immature platelets are increased when there is peripheral platelet consumption associated with increased bone marrow production and premature release into circulating blood. Immature platelet fraction (IPF) represents the total number of immature platelets to the total number of platelets, expressed as a percentage (%-IPF). Many automated analysers report %-IPF, and a recent study validated normal reference ranges for men and women(1).

There is a general agreement that %-IPF is a reliable index to discriminate platelet hyperconsumption / hyperdestruction from hypoproduction. However, there is limited evidence for its clinical utility in immune thrombocytopenia (ITP).

AIM & METHOD

We conducted a single centre analysis of a selected number of ITP patients using data from Sysmex-XN20 a fully automated haematology analyser, The Sysmex XN20 uses a fluorescence channel PLT-F to detect mature and immature platelets using a proprietary dye that stains intracellular megakaryocyte-derived RNA in immature platelets. We correlated the immature platelet fraction % (IPF%) with their platelet counts.

We have also selected a number of ITP patients to illustrate the longitudinal relationship between platelet counts and IPF% in response to treatment.

CONCLUSIONS

The data demonstrates a clear dynamic inverse correlation between platelet counts and %-IPF in ITP. We confirm that an elevated %-IPF is a useful indicator of peripheral platelet consumption in ITP and can be used to support the diagnosis of ITP.

In the event of a significant thrombocytopenia where %-IPF is in the low or normal range, an alternative diagnosis to ITP should be considered.

In cases where patients have not responded to medical intervention in terms of platelet counts, but show a rise in IPF, it may be possible to use IPF to provide an insight into functional response, and as a measure of megakaryopoietic response.

RESULTS

Twenty-seven (12M; 15F) patients with primary ITP for which we had a least one %-IPF result were identified. Median age (range) of patients was 41.5 (23-96) years. A total of 260 %-IPF results were available for the 27 patients. 58/260 %-IPF results were for platelet counts less than 40 x 10^9/L (range; 0-37 x 10^9/L) and %-IPF ranged from 2.7-51.4%. Using the validated normal reference ranges for %-IPF in men (1.8-10%) and women (1.5-10.1%), all 58 results, with the exception of one had a %-IPF above the reference range. The one patient with a low %-IPF presented with acute ITP, and 5 days after starting prednisolone the %-IPF had increased to 23.8%. Of the 27 patients, 21 patients normalised their %-IPF when platelets rose above 150 x 10^9/L. The 6 patients that still had high %-IPF's, were chronic ITP patients with frequent relapses which may be the cause of the persistently raised %-IPF. We highlight some individual examples of the relationship between platelet count and IPF in the figures below.

Cross-sectional analysis of these patients demonstrated a dynamic inverse correlation between %-IPF and rising platelet counts following treatment. A Pearson's correlation coefficient of r = - 0.455 was calculated (p <0.0005).

Figure 1: Scatter plot to show the relationship between platelet count and immature platelet fraction

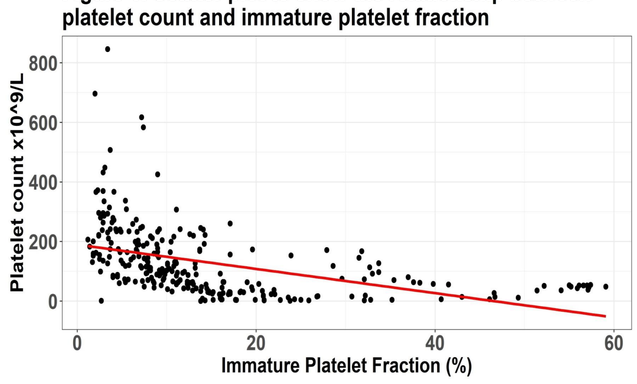


Figure 2: 36 F, Chronic ITP. Wide fluctuations in platelet counts. Intolerant of eltrombopag and avatrombopag. This figure highlights nicely, the inverse relationship of platelet count and IPF with multiple lines of treatment.

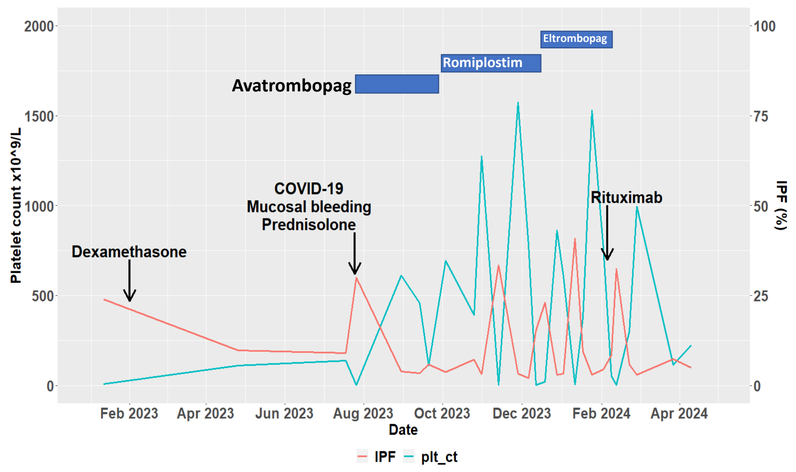


Figure 3: 51 M, Chronic ITP. After the patient is treated with corticosteroids we see the platelet count and IPF normalise.

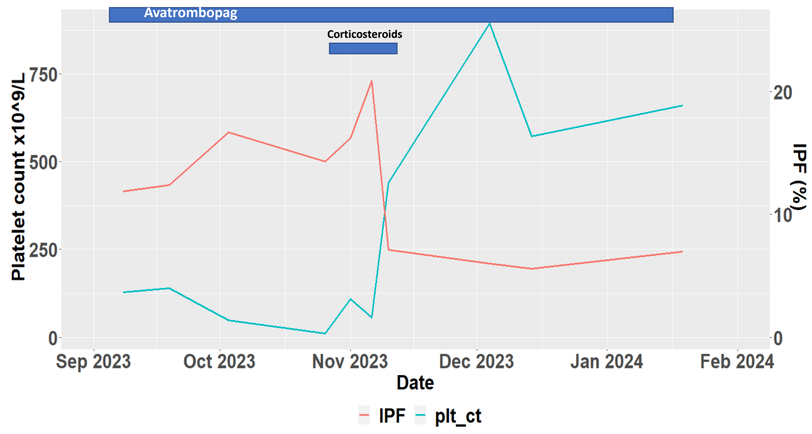


Figure 4: 41 F, Chronic ITP on Romiplostim. Addition of dapsone shows a rise in IPF but only a very modest rise in platelet count. The peak platelet count corresponds with corticosteroids. Here the IPF shows that although the platelet count failed to respond to dapsone, there is an IPF response to the new drug. This case shows it may be possible to use IPF response as a useful endpoint of treatment.

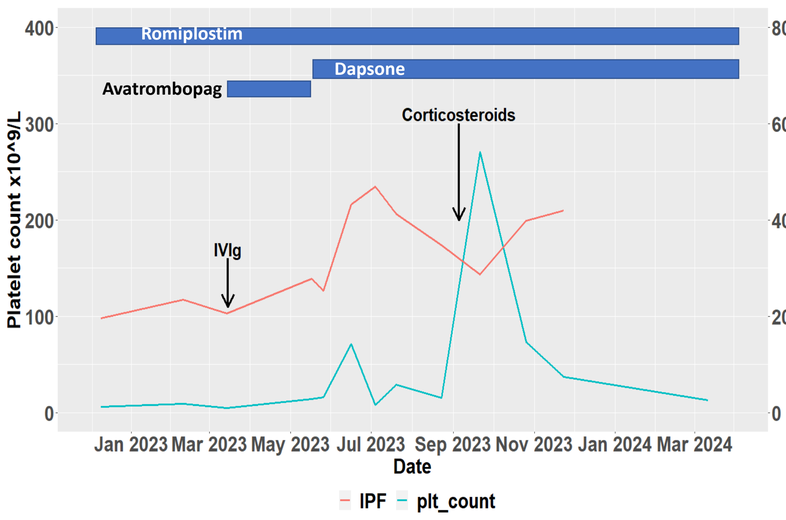
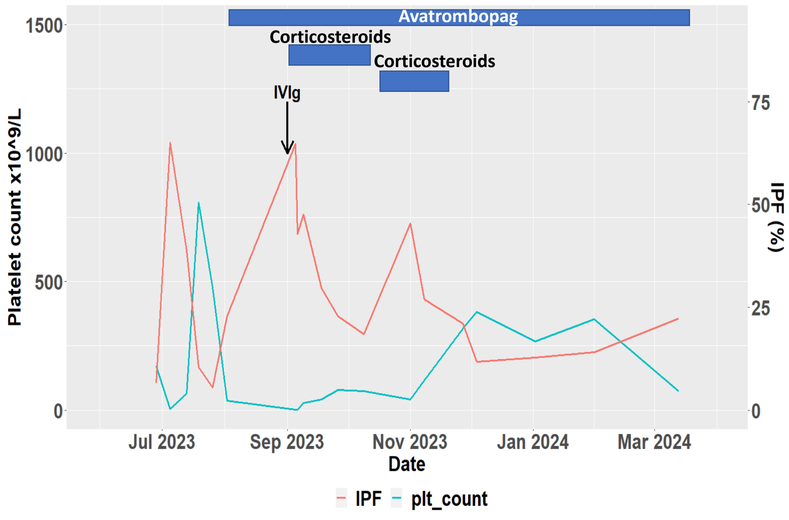


Figure 5: 50 F, Chronic ITP with stabilisation of the platelet count and IPF with avatrombopag. It also illustrates IPF response to steroids without a rise in platelets, similar to figure 4.



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