Post-procedural Platelet Function Testing in Neuroendovascular Surgery is Predictive of Ischemic Complications

Yiping Li MD, Jason Kim BS, Beverly Kienitz MD, David Niemann MD, Azam Ahmed MD

Department of Neurological Surgery and Neuro Interventional Radiology – University of Wisconsin School of Medicine and Public Health

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Disclosures

• None
Introduction

• Thromboembolic and hemorrhagic complications remain the most common cause of morbidity and mortality after endovascular therapy.

• The use of Platelet Functional Testing and clopidogrel titration has been shown to reduce adverse events.
  – The main limitation of prior literature is the lack of post-procedural PFT and the unknown effect of the stress of surgery on platelet inhibition.

• The aims of this study is to:
  – Evaluate the utility of PFT pre and post intervention
  – Determine if there is an optimal postprocedural PRU cut-off which may be associated with lower rates of thromboembolic and hemorrhagic complications.
Methods

• Study population
  – Prospectively collected data between 2014 and 2019 of all patients who underwent PED
  – PRU value and Clopidogrel Dose was collected from 10 days pre-procedure and 10 days post-procedure

• Statistical analysis
  – PRU values were compared using the Mann-Whitney U-test before and after surgery while categorical or proportional variables were compared using the Fisher’s exact test
  – The ability to dichotomize PRU values to predict outcome was assessed using area under the curve calculations
  – Univariate variables with p-value <0.10 and those of clinical relevance were included in the stepwise multivariate regression analysis to predict development of post-operative ischemic or hemorrhagic complications.
Results: Cohort Characteristics

- Of the 184 patients included in the study, 52 were male (28%), 108 were smokers (59%), and 64 had hypertension (35%).
- In total 18 patients (10%) required a second line P2Y12 inhibitor (prasugrel) due to clopidogrel resistance. 10 (56%) of which were identified preoperatively while 8 (44%) developed resistance postoperatively.
- The average number of PFT prior to surgical intervention was 1.9±1.1. Most patients (95%) received PFT on postoperative day (POD) 1 with an average of 2.9±1.1 PFT within the first 4 PODs.
- The average number of PFT obtained between POD 4-10 and between POD 10-30 was 2.8±1.9 and 4.2±3.4 respectively. In total 1337 PFT were obtained with a median of 6.0±3.6 per patient.
Results: PRU and Clopidogrel Trends

- The mean preprocedural PRU was 144.8±58.7 compared to a postprocedural PRU of 221.6±65.4.
- The average change in PRU from day of surgery to POD 1 was +69.3±71.8.
- Between POD 1-4 the average per day change in PRU was -60.6±43.4 until POD 4-10 when PRU variability decreased to an average per day change of +1.0±18.1.

PRU and clopidogrel dose trends over time with best of fit graphs.
Equations are calculated to match each of the four phases of platelet function testing.
• Comparing groups before and after surgery, there is a significant median difference in PRU variability as a result of surgical intervention.

• The smallest, largest, and average PRU values differed between groups as did the clopidogrel dose and number of dose adjustments before and after surgery (p<0.0001).

• Preoperative PRU variance differed between variance from POD 0-1 and POD 1-4 (p<0.0001), but not between POD 4-10 (p = 0.6).

• Increased variance in platelet inhibition during the first four POD resulted in a higher percentage of tests being outside previously established therapeutic range of 60-220 with 25% of tests being <60 (p<0.0001) and 17.6% >220 (p=0.03)
Results: Post-procedure PRU Predicts Thromboembolic Complications

- Receiver Operator Curve Analysis suggested an optimal PRU threshold of <253 with higher odds of thromboembolic complications outside this limit (OR 8.4; 1.7-40.8; 95% CI).
- Preprocedural PRU values were not significantly predictive for developing thromboembolic complications.

ROC AUC Plot of PRU Pre-procedure, PRU on the day of surgery, and PRU post-procedure on predicting thromboembolic complications.
- The AUC and its corresponding P-value are shown.
Discussion

• These findings suggest there may be clinical utility in monitoring post-procedure PFT in patients undergoing PED placement especially during the first four postoperative days when platelet inhibition variability remains greatest.

• Postprocedural clopidogrel resistance may be related to genetic polymorphisms of cytochrome P450 and the P2Y12 receptor and therefore affected by liver function and acute phase reactions seen during administration of general anesthesia and with surgical intervention.

• One potential explanation of relatively low complication rates seen in our cohort may be explained by conscientious monitoring of postprocedural PFT to reduce the impact of PRU variability seen in the immediate postoperative period.
Summary Points

• There is clinical utility in monitoring PFT post-procedure in patients undergoing PED.
• Patients often experience significant variability in clopidogrel response in the immediate perioperative period.
• Post-procedure PRU>253 significantly predict the development of postprocedural thromboembolic complications.
• Further studies are required to assess the effect of postprocedural PRU monitoring on complication rates and determine an optimal therapeutic range to decrease PED associated thromboembolic and hemorrhagic complications.
Acknowledgements

• Special thank you to Dr. Robert Dempsy, Chairman, Department of Neurological Surgery for research support and guidance
Bibliography