

FOCUS ON RESEARCH

PLATELET ACTIVATION AND TROPONIN 1 RELEASE FOLLOWING MAJOR VASCULAR SURGERY

Researchers

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Aim

The leading cause of death following surgery in patients with disease of their lower limb blood vessels is a heart attack. Platelets are particles present in the blood, which if activated may predispose to the blockage of arteries and thus a heart attack. We wished to determine if platelet activity was increased following surgery and whether it could be used to identify patients who were at a high risk of developing damage to their heart.

Project Outline/Methodology

136 patients undergoing elective surgery were recruited. Platelet function was assessed by 1. measuring markers on their surface which increase when the platelets are activated (flow cytometry) and 2. their stickiness (aggregation). The patients underwent continuous recording of their heart for 72 hours following surgery and daily blood tests to measure a substance known as troponin-I which is increased if there is damage to the heart.

Key Results

This study has shown, for the first time, a significant increase in both flow cytometry measured markers of platelet activation and stickiness following major vascular surgery. It also showed that following surgery over half the patients did not respond to the drug aspirin which is supposed to reduce stickiness. Nearly a third of the patients showed evidence of damage to their heart following surgery. Patients who had a rise in troponin-I alone were more likely not to respond to treatment with aspirin.

Conclusions

This study has shown that surgery caused platelets to become activated. While this may lead to blockages of arteries in the heart and elsewhere we did not show that we could predict a patients chance of developing damage to their heart by measurement of platelet activity alone.

What does this study add to the field?

This is the first study to show the presence of non-response to aspirin in patients undergoing surgery for disease of their lower limb blood vessels. This non-response to aspirin has also been shown to occur in patients undergoing heart bypass surgery. This study has also shown that platelet stickiness can be easily measured using a bed-side test. We thus now have the ability to determine if patients are not responding to aspirin following surgery and to prescribe individually targeted treatment. Studies suggest that the drug clopidogrel may be more effective than aspirin in patients who have disease of their lower limb blood vessels in preventing heart complications. However, it is more expensive and may also cause increased bleeding which may be a problem following surgery. The use of this bed-side test may allow more appropriate and selective use of clopidogrel with the aim of possibly reducing heart complications.

Implications for Practice or Policy

This study has shown the need to closely monitor patients undergoing vascular surgery for at least 48 hours so that heart complications can be identified and treated. These patients should therefore be cared for in a "high dependency" during this time period. It also suggests the need for individual patient targeted anti-platelet therapy in these patients.

Where to next?

The patients in the study will be followed up to 2 years to assess whether there is any relationship between platelet function and outcome in terms of success of surgery and overall patient survival. We intend to apply for funding to assess further the post-operative non-response to aspirin observed in this study. In particular we wish to assess the effect of increasing the dose of aspirin or the use of alternative anti-platelet agents in the post-operative period on platelet function and clinical outcome in patients.

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