

AUTHOR: Curtis L. Cetrulo, Jr., M.D

INSTITUTION: Long Island Plastic Surgical Group, Garden City, New York

TITLE: CELLULAR, MOLECULAR AND GENETIC ETIOLOGIES OF
INTRAOPERATIVE MICROVASCULAR ANASTOMOTIC FAILURE

INTRODUCTION:

Rare intraoperative microvascular anastomotic failure by intractable vasospasm-thrombosis has been explained by reactive thrombocytosis and/or hypercoaguability. A third hypothesis involves a genetic predisposition to vasospasm: patients with mutations in the endothelial nitrous oxide synthase (eNOS) gene exhibit a propensity for systemic vasospastic conditions.

METHODS:

In 14 flap failures from 171 microsurgical procedures, 2/3 intraoperative failures revealed a possible etiology. *Case 1*, a male Type-II-diabetic who underwent lower extremity free-tissue-transfer exhibited intractable vasospasm-thrombosis of the anastomosis. *Case 2* (non-diabetic male) exhibited a similar clinical course. *Case 1's* DNA was analyzed by RT-PCR for the presence of the T-786-C-single-nucleotide-polymorphism of the eNOS gene, a mutation associated with vasospastic conditions. *Cases 1 & 2* were tested for a full hypercoaguability panel, reactive thrombocytosis, and aspirin and/or heparin resistance.

RESULTS:

Case 1: RT-PCR demonstrated heterozygosity (T/C) for the eNOS gene (Figure 1). *Case 2:* Reactive thrombocytosis coinciding with the timing of the attempted free tissue transfer was exhibited (Figure 2). *Cases 1&2.:* Perioperative platelets, hypercoagulability, & aspirin-heparin resistance were within normal limits.

CONCLUSIONS:

These data provide preliminary evidence for two distinct genetic/molecular and cellular etiologies for intraoperative microvascular vasospastic failures. Vascular endothelial dysfunction due to underproduction of nitric oxide via the endothelial isoform of nitric oxide synthase can result in pathologic vasospasm and thrombosis and has been established as factor in numerous cardiovascular and cerebrovascular vasospastic conditions. This report represents the first description of a possible similar pathophysiology in the setting of reconstructive microsurgery, describing a genetic predisposition to vasospasm-thrombosis in the context of an intraoperatively failed free flap. Similarly, reactive thrombocytosis has been implicated in acute flap failure in the microsurgical literature. These preliminary data identify possible molecular targets for prevention of intraoperative vasospasm, and may assist in identifying patients at increased risk for free flap loss.