Comparing the Outcomes of Different Agents to Treat Vasospasm at Microsurgical Anastomosis during the Papaverine Shortage

Joseph A. Ricci, M.D.
Pieter G. Koolen, M.D.
Jimesh Shah, B.S.
Adam M. Tobias, M.D.
Bernard T. Lee, M.D., M.B.A., M.P.H.
Samuel J. Lin, M.D., M.B.A.

Boston, Mass.; and Amsterdam, The Netherlands

Background: Papaverine remains popular for treating intraoperative vasospasm, but the recent shortage has forced surgeons to trial antispasmodic agents unproven in microsurgery but commonly used in other body areas. During this shortage, the authors have used topical lidocaine and nicardipine to break intraoperative vasospasm. This study aims to analyze the outcomes of these medications on flap complications compared with papaverine.

Methods: All consecutive free flaps performed for breast reconstruction at a single institution were reviewed. Data collected included patient demographics, comorbidities, complications, and type of antispasmodic agent. Rates of reexploration, complications, and flap salvage were compared between patients receiving antispasmodic agents and matched papaverine controls.

Results: Of the 1087 flaps treated with antispasmodic agents, nicardipine was used on 59 flaps and lidocaine was used on 55 flaps. Patients treated with lidocaine had higher body mass indexes (31.0 kg/m^2 versus 27.4 kg/m^2; $p = 0.001$). Patients treated with nicardipine tended to be older (64.0 versus 48.5; $p < 0.01$) and have a history of hypertension (22.0 percent versus 10.4 percent; $p = 0.08$) or preoperative irradiation (32.2 percent versus 13.6 percent; $p = 0.016$) compared with papaverine controls. No differences in the rates of total or partial flap loss, unplanned return to the operating room, or fat necrosis were observed between any of the groups. However, the nicardipine group demonstrated a higher rate of infection (15.3 percent versus 3.4 percent; $p = 0.027$).

Conclusion: Substituting lidocaine or nicardipine for papaverine to treat vasospasm did not demonstrate an increased rate of flap loss or return to the operating room, making these medications safe and efficacious alternatives to papaverine. (*Plast. Reconstr. Surg.* 138: 401e, 2016.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, III.

Despite many years of experience with free tissue transfer and high anastomotic patency rates, intraoperative vasospasm continues to be common, often unpredictable, and potentially devastating with regard to flap survival in microvascular surgery.[1] Vasospasm can cause complete obstruction of blood flow to the flap, effectively strangling it, and may result in formation of thrombi, which could cause permanent ischemia to the flap. Vasospasm is caused mainly by intraoperative dissection and manipulation of small-caliber blood vessels, which is inevitable in microsurgery and is estimated to affect between 5 and 10 percent of all microsurgical procedures.[1,2] One of the well-established methods to deal with vasospasm is the application of topical vasodilating agents. There are currently many medications that can be used, but no standard algorithm exists. Drug choice varies by institution and can shift as a result of changes in the availability of individual medications.[2]

From the Division of Plastic and Reconstructive Surgery, Department of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School; and the Department of Plastic Surgery, Vrije Universiteit Medical Center, Vrije Universiteit.
Received for publication October 3, 2015; accepted April 11, 2016.
Copyright © 2016 by the American Society of Plastic Surgeons
DOI: 10.1097/PRS.0000000000002430

Disclosure: *The authors have no financial interest in any of the products mentioned in this article. There was no internal or external financial support for this study.*

Copyright © 2016 American Society of Plastic Surgeons. Unauthorized reproduction of this article is prohibited.