

Comparison of vasodilatation responses of arterial grafts harvested with and without electrocautery: *in vitro* study results

Elektrokoter ile veya elektrokotersiz hazırlanan arter greftlerinin vazodilatasyon yanıtlarının karşılaştırılması: İn vitro çalışma sonuçları

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Dear Editor,

We read with great interest the article of Gurkan et al.^[1] published in your Journal's fourth issue of the year 2015. We believe that their study has contributed significantly to the literature and to the readers of Turkish Journal of Thoracic and Cardiovascular Surgery. However, we believe a few points need to be emphasized.

The authors studied internal thoracic artery (ITA) samples that were harvested with electrocautery or grafts harvested without cautery. It has been shown that ITA is considered to be the best conduit for coronary artery bypass grafting (CABG), as it exhibits vascular adaptation early and late after surgery, low susceptibility to atherosclerosis, and a high capacity to secrete vasoactive mediators.^[2,3] The use of ITA grafts improves the outcomes of CABG and provides the highest long-term patency for all diseased coronaries.^[3] Therefore, preservation of the vitality of its endothelial functions is the major duty for cardiac surgeons who harvest this conduit for CABG operations. In a recent study, Onan et al.^[2] studied the effects of electrocautery on endothelial-cell and vessel-wall morphology at the ultrastructural level during ITA harvesting. The study group was compared with ITA that was harvested with sharp dissection. The authors concluded that the integrity of endothelial cells could be better preserved when the ITA is mobilized by means of sharp dissection, rather than solely by electrocautery.

The study by Gurkan et al.^[1] presented an additional finding in terms of endothelial physiopathology. The authors nicely presented that vasodilatory response of ITA after electrocautery use is decreased, compared to the sharp dissection.

Currently, the use of electrocautery is the most common and simple way of ITA harvesting. This energy source is utilized in the learning curve of young surgeons. Nevertheless, as seen in operations, ITA flow decreases if cautery is used for ITA mobilization. In our study^[2] ITA flows were measured in both groups. We observed that free ITA flow in our sharp dissection group was significantly higher than that in our electrocautery group. This confirms that the use of electrocautery may cause vasospasm and may require the use of vasodilators such as papaverine. However, the authors^[1] did not measure free ITA flow in their study, which is a major limitation. Decreased free ITA flow, a clinical sign of vasospasm, can be detected during surgery.

Thermal injury to the smooth muscle and endothelial cells is not a macroscopic finding, and it can go undetected intraoperatively. Ultrastructural changes in the grafts after electrocautery harvesting have been noted in a few studies.^[2,4] On the other hand, the authors concluded that the use of electrocautery might result in serious endothelial injury in the ITA graft. This statement causes a conflict because they showed no evidence of an endothelial injury using a microscopic data or any histopathologic damage using ultrastructural endothelial functional analysis with secretion of enzymes such as nitric oxide, adenosine or anti-oxidant agents. We believe that the use of microscopy or histopathological evidences might contribute the study results.

We conclude that this study makes an additional support to the known disadvantages of electrocautery use for internal thoracic artery harvesting.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.



Available online at
www.tgkdc.dergisi.org
doi: 10.5606/tgkdc.dergisi.2016.12625
QR (Quick Response) Code

Received: November 12, 2015 Accepted: November 19, 2015

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Funding

The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. Gurkan S, Gur O, Yuksel V, Guclu O. Comparison of vasodilatation responses of arterial grafts harvested with and without electrocautery: in vitro study results. *Türk Gogus Kalp Dama* 2015;23:631-6.
2. Onan B, Yeniterzi M, Onan IS, Ersoy B, Gonca S, Gelenli E, et al. Effect of electrocautery on endothelial integrity of the internal thoracic artery: ultrastructural analysis with transmission electron microscopy. *Tex Heart Inst J* 2014;41:484-90.
3. Bakay C, Onan B, Korkmaz AA, Onan IS, Özkara A. Sequential in situ left internal thoracic artery grafting to the circumflex and right coronary artery areas. *Ann Thorac Surg* 2013;95:63-70.
4. Lehtola A, Verkkala K, Järvinen A. Is electrocautery safe for internal mammary artery (IMA) mobilization? A study using scanning electron microscopy (SEM). *Thorac Cardiovasc Surg* 1989;37:55-7.

Author's Reply

Dear editor,

Firstly, we would like to express our thanks to the authors for their insightful comments to our original article entitled 'Comparison of vasodilatation responses of arterial grafts harvested with and without electrocautery: in vitro study results' published in the recent issue of this journal.^[1]

Of note, the main distinguishing feature of our study from other experimental studies is the utilization of an organ bath system. Organ bath system demonstrates physiological effects of endothelial injury, whereas immunohistochemical microscopic studies may only

show morphological changes of the internal thoracic artery.

On the other hand, there are several histopathological reports on thermal internal thoracic artery injury in the literature.^[2-4] In our study, we used carbachol to induce nitric oxide-mediated vasodilatation. Accordingly, all vasodilatation responses are already due to endothelium-derived nitric oxide.

In conclusion, there are several factors affecting the internal thoracic artery flow other than harvesting techniques used such as hypotension, vasospasm, and hypothermia. We, therefore, conclude that reduced internal thoracic artery flow per se is unable to show the endothelial function.

REFERENCES

1. Gurkan S, Gur O, Yuksel V, Guclu O. Comparison of vasodilatation responses of arterial grafts harvested with and without electrocautery: in vitro study results. *Türk Gogus Kalp Dama* 2015;23:631-6.
2. Bulat C, Pešutić-Pisac V, Capkun V, Marović Z, Pogorelić Z, Družijanić N. Comparison of thermal damage of the internal thoracic artery using ultra high radiofrequency and monopolar diathermy. *Surgeon* 2014;12:249-55.
3. Onan B, Yeniterzi M, Onan IS, Ersoy B, Gonca S, Gelenli E, et al. Effect of electrocautery on endothelial integrity of the internal thoracic artery: ultrastructural analysis with transmission electron microscopy. *Tex Heart Inst J* 2014;41:484-90.
4. Ohtsuka T, Takamoto S, Endoh M, Kotsuka Y, Oka T. Ultrasonic coagulator for video-assisted internal mammary artery harvest. *Surg Endosc* 2000;14:82-5.

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