

EUROPEAN SOCIETY FOR SURGICAL RESEARCH

ESSR 2012

47th Annual Congress

6-9 June 2012

LILLE - FRANCE



www.essr2012.com

FINAL PROGRAMME



Université Lille 2
Droit et Santé



Université Lille Nord de France
Fédération des Universités
et des Hauts de France



Centre Hospitalier Régional
Universitaire de Lille

OP-49

Postconditioning to reduce local muscle injury after long-lasting vascular occlusions

Z. Turoczy^{1,*}, A. Fulop¹, D. Garbaisz¹, J. Szabo¹, Z. Czigan¹, G. Lotz², L. Harsanyi¹, A. Szijarto¹

¹Experimental Surgery and Training Center of 1st Department of Surgery, ²2nd Department of Pathology, Semmelweis University, Budapest, Hungary

Introduction

Revascularization of long-lasting acute lower limb vascular occlusions might compromise the survival of both the extremity and the patient, due to severe local and systemic complications of the ischemia-reperfusion (IR) injury. Reducing the degree of IR damage has therefore, a great importance. Postconditioning (PostC) is an easily applicable surgical method consisting of brief repetitive reperfusion and reocclusion periods at the onset of reperfusion, which is reported capable of reducing IR injury.

Objectives

Our aim was to test the potency of postconditioning after a long-lasting ischemic event.

Material/Patients and Methods

Male Wistar rats (n=60) underwent 8 hours of bilateral lower limb ischemia achieved by infrarenal aortic occlusion. Ischemia was followed by 2, 6, 12, 24 hours of reperfusion. In one group of each reperfusion period, postconditioning (10/10 sec. in 6 cycles) was applied. Sham operated animals underwent the same procedure except ischemia induction. The microcirculatory changes were measured by laser Doppler flowmeter till the 2nd hour of reperfusion. At the end of reperfusion samples were collected from the anterior tibial muscle for routine histological staining and for NADH-tetrazolium reductase (TR) enzyme-histochemistry to assess viability. Blood samples were taken for necro-enzyme measurements (CK).

Results

The degree of muscle injury increased with the length of reperfusion in the IR group from the mild damage detected at 2nd post-ischemic hour to the severe necrotic changes detected at 24th post-operative hour. Strongly reduced histological injury was found in the IR+PostC group at every examined time point. Necro-enzyme levels showed a peak at the 6th post-ischemic hour (IR: 6146.5 ± 1708.6 , IR+PostC: 5948.4 ± 1972.7 IU/L) then decreased to the normal level by the end of the 1st day (IR: 256.8 ± 86.1 , IR+PostC: 190.3 ± 91.5 IU/L), significant difference was not shown between the IR groups except at the 2nd postoperative hour in favor of the IR+PostC group ($p=0.049$). Viability determined by the quantitative evaluation of NADH-TR staining reduced gradually in the IR group with the progress of reperfusion (2h: 12.2 ± 5.3 6h: 12.5 ± 2.1 ; 12h: 10.4 ± 3.1 ; 24h: 8.7 ± 2.3 %), the IR+PostC group however showed no further viability loss after the 2nd post-operative hour (2h: 29.4 ± 3.2 6h: 28.5 ± 9.2 ; 12h: 27.9 ± 5.4 ; 24h: 30.7 ± 4.1 %). Viability differed significantly between the IR and IR+PostC groups at every examined time points ($p<0.05$). Microcirculation showed significant amelioration of plateau maximum ($p=0.038$) and reperfusion area ($p=0.013$) in the IR+PostC group compared to the IR group. (PM: 24.5 ± 22.7 vs. 62.3 ± 20.3 , RT: 25.4 ± 17.8 vs. 63.3 ± 20.7 %).

Conclusion

Postconditioning could be a feasible technique to reduce IR injury after long-lasting lower limb vascular occlusions.

Conflict of interest : None

OP-50

Training a sophisticated microsurgical technique: Interposition of external jugular vein graft in the common carotid artery in rats

K. Schleimer^{1,*}, J. Grommes¹, A. Greiner¹, H. Jalaie¹, J. Kalder¹, S. Langer¹, T. Koepfel¹, M. Jacobs¹, M. Kokazidou¹

¹Vascular Surgery, University Hospital Aachen, Aachen, Germany

Introduction

Neointimal hyperplasia is the primary cause of stenosis in arterialized veins that are of great importance in arterial coronary bypass surgery, in peripheral arterial bypass surgery as well as in arteriovenous fistulas.¹⁻⁵ The experimental procedure of vein graft interposition in the common carotid artery has been applied in several research projects to examine the aetiology of neointimal hyperplasia and therapeutic options to address it.⁶⁻⁸ Using the superior caval vein graft is an established small-animal model for venous arterialization experiments.⁹⁻¹¹

Objectives

To minimize the number of experimental animals needed and to simplify the procedure, this current paper proposes a new operation protocol by video training which should help the novice surgeon to learn both the cuff technique and the vein graft interposition.

Material/Patients and Methods

Hereby, the right external jugular vein was grafted in cuff technique in the common carotid artery of 21 female Sprague Dawley rats categorized in three equal groups that were sacrificed on day 21, 42 and 84, respectively. Notably, no donor animals were needed, because auto-transplantations were performed.

Results

The survival rate was 100 % at the time point of sacrifice. In addition, the graft patency rate was 60 % for the first 10 operated animals and 82 % for the remaining 11 animals. The blood flow at the time of sacrifice was 8 ± 3 ml/min.

Conclusion

In conclusion, this proposed surgical protocol considerably simplifies, optimizes and standardizes this complicated procedure. It gives novice surgeons easy, step-by-step instruction, explaining possible pitfalls, thereby helping them to gain expertise fast and avoid useless sacrifice of experimental animals.

References

- Matwani, J.G., Topol, E.J. Aortocoronary saphenous vein graft disease: Pathogenesis, Predisposition, and Prevention. *Circulation* 97, 916-931 (1998).
- Bonatti, J., Oberhuber, A., Schachner, T., Zou, Y., Hammerer-Lercher, A., Mittermair, R., Laufer, G. Neointimal hyperplasia in coronary vein grafts: Pathophysiology and prevention of a significant clinical problem. *The Heart Surg. Forum* E72-E87 (2004).
- Roy-Chaudhury, P., Kelly, B.S., Zhang, J., Narayana, A., Desai, P., Melhem, M., Duncan, H., Heffelfinger, S.C. Hemodialysis Vascular Access Dysfunction: From Pathophysiology to Novel Therapies. *Blood Purif.* 21, 99-110 (2003).
- Dixon, B.S. Why don't fistulas mature? *Kidney Int.* 70, 1413-1422 (2006).
- Newby, A.C., Zaltsman, A.B. Molecular mechanisms in intimal hyperplasia. *J. Pathol.* 190, 300-309 (2000).
- Schachner, T., Heiss, S., Zipponi, D., Tzankov, A., Bernecker, O., Kroell, A., Laufer, G., Bonatti, J. Perivascular treatment with azathioprine reduces neointimal hyperplasia in experimental vein grafts. *Heart Surg. Forum* 9, E 515-517 (2006).
- Zhang, L., Sivashanmugam, P., Wu, J.H., Brian, L., Exum, S.T., Freedman, N.J., Peppel, K. Tumor necrosis factor receptor-2 signaling attenuates vein graft neointima formation by promoting endothelial recovery. *Arterioscler. Thromb. Vasc. Biol.* 28, 284-289 (2008).
- Schachner, T., Zou, Y., Oberhuber, A., Tzankov, A., Mairinger, T., Laufer, G., Bonatti, J.O. Local application of rapamycin inhibits neointimal hyperplasia in experimental vein grafts. *Ann. Thorac. Surg.* 77, 1580-1585 (2004).
- Zou, Y., Dietrich, H., Hu, Y., Metzler, B., Wick, G., Xu, Q. Mouse Model of Venous bypass graft arteriosclerosis. *A.J.P.* 153, 1301-1310 (1998).
- Schachner, T., Oberhuber, A., Zou, Y., Tzankov, A., Ott, H., Laufer, G., Bonatti, J., Rapamycin treatment is associated with an increased apoptosis rate in experimental vein grafts. *Eur. J. Cardiothorac. Surg.* 27, 302-306 (2005).
- Ali, Z., Bursill, C., Hu, Y., Choudhury, R.P., Xu, Q., Greaves, D.R., Channon, K.M. Gene transfer of a broad spectrum CC-chemokine inhibitor reduces vein graft atherosclerosis in apolipoprotein E-knockout mice. *Circulation* 30, 1235-1241 (2005).

Conflict of interest : None