Lateral Thoracic Artery Perforator Island Flap in Rat: Definition of Choke Vessels By Angiography and Immunohistochemistry

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Introduction:

In the perforator flap era, reconstructive surgeons have changed their point of view from random and axial patterns flaps to perforator flaps because their donorsites demonstrate less postoperative morbidity[1] Despite the well studied vasculature of the entire skin of the rat dorsum[2] there is no perforator flap that has been described from dorsal region in an animal model.

We here demonstrated: 1) a novel, definable and reproducible lateral thoracic artery perforator flap model, 2) the cutaneous territory of the lateral thoracic artery perforator flap by angiography and by immunohistochemistry.

Materials and Methods:

To assess the vascular territories that can be supplied by single lateral thoracic artery perforator, rats were numbered and randomized into three groups: Group A : the hemidorsal island skin flap measuring 4x11 cm was designed based only the most cranial perforator of lateral thoracic artery of right side. Group B: The entire dorsal island skin flap measuring 8x11 cm was designed based only the most cranial perforator of lateral thoracic artery of right side. Group C: The entire dorsal island skin flap measuring 8x8 cm was designed based only the most cranial perforator of lateral thoracic artery of right side. (Figure 1)

Results

The mean percentages of surviving flap area and necrotic area are 95 ± 4 % and 4 ± 0,4 %, respectively in Group A, 92 ± 5 % and 7 ± 4 % in Group B, and 89 ± 7 % and 11 ±8 % in Group C (Table 1).

There were no statistically immunoreactive cells for CD11b, ICAM-1, and VEGF-R2 in three different territories of Group A ($p>0,05$). ICAM-1 and VEGF-R2 were significantly

increased in dynamic territory compared to anatomic and potential territories of Group B ($p<0,05$). In Group C, ICAM-1 were significantly increased in dynamic territory compared to anatomic and potential territories ($p<0,05$)(figure 2).

Conclusion

Our study demonstrate the first single lateral thoracic artery perforator based skin flap with a defined artery and vein can be raised on the dorsum of rat. The flap necrosis occurs in the contralateral lateral thoracic artery territories. The present finding revealed that the lateral thoracic artery anastomoses with the ipsilateral posterior intercostal, the contralateral posterior intercostal and deep circumflex iliac arteries.

Refrences

1. Koshima I, Soeda S. Inferior epigastric artery skin flaps without rectus abdominis muscle. Br J Plast Surg 1989;42:645e8.
2. Zhuang Y, Hu S, Wu D, Tang M, Xu da C. A novel in vivo technique for observations of choke vessels in a rat skin flap model. Plast Reconstr Surg. 2012 130(2):308-17.

FIGURE LEGENDS

Figure 1: The design of the lateral thoracic artery perforator flap

Table 1: The intact flap surface area and necrotic area of the rats in all groups measured on the 7 after surgery.

Figure 2: Angiographic and immunological datas of groups

		n	Mean	Min	Max
Flap Survival Area (%)	Group A	8	95,8±4,8	88,0	100,0
	Group B	8	92,3±5,0	87,0	100,0
	Group C	8	89,1±7,8	78,0	97,0
Necrotic Flap Area (%)	Grup A	8	4,2±4,8	0,0	12,0
	Grup B	8	7,7±5,0	0,0	13,0

	Grup C	8	11,3±8,0	3,0	22,0