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Available online 30 October 2012

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<http://dx.doi.org/10.1016/j.ejvs.2012.10.004>

DOI of original article: <http://dx.doi.org/10.1016/j.ejvs.2012.09.024>

#### Comment on: 'Factors Influencing Wound Healing of Critical Ischaemic Foot after Bypass Surgery: Is the Angiosome Important in Selecting Bypass Target Artery?'

Dr. Azuma and his colleagues' paper categorized the revascularization of an angiosome as direct or indirect. This fails to recognize the 3 dimensional anatomy of angiosomes that includes arterial—arterial connections in the foot and ankle between the arteries feeding the angiosomes. By failing to recognize the critical role those connections play in revascularization, the paper cannot accurately judge the quality of revascularization of a given angiosome.

In counter-distinction, Varela's paper<sup>1</sup> recognizes that fact by describing 3 types of revascularization of a given angiosome: direct, indirect through arterial—arterial connections and indirect. They found no significant difference in healing and limb salvage rates between the directly revascularized group and the indirectly revascularized via arterial—arterial connection(s) group. On the other hand, there was a significant difference between both groups when compared to the indirectly revascularized group without arterial—arterial connections.

I recommend adopting the Varela's categorization of revascularization whenever using the angiosome concept to more accurately evaluate the quality of revascularization, limb salvage rates and wound healing outcomes. The first would be the direct revascularization (DR) of the artery feeding a given angiosome. The second would be the indirect revascularization (IRc) of the artery feeding a given angiosome via arterial—arterial connections. The third would be indirect revascularization (IR) where the artery feeding the angiosome remains occluded. In this instance, healing will depend on whether the "choke" vessels<sup>2</sup> between angiosomes eventually open up or not.

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Available online 30 October 2012

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<http://dx.doi.org/10.1016/j.ejvs.2012.09.019>

DOI of original article: <http://dx.doi.org/10.1016/j.ejvs.2012.09.018>

#### Response to Letter to the Editor: 'Factors Influencing Wound Healing of Critical Ischaemic Foot after Bypass Surgery: Is the Angiosome Important in Selecting Bypass Target Artery?'

Dear Editor,

As the author of the letter mentioned, the arterial connection between angiosomes is crucial to determine the efficacy of angiosome-indirect revascularisation. However, it was not easy to classify IRc (indirect revascularisation with arterial—arterial connection) and IR (indirect revascularisation without arterial—arterial connection) because of the following reasons. (1) Preoperative arterial images such as DSA from the femoral artery, sometimes failed to show a detailed arteriogram in a severely ischaemic foot because a sufficient amount of contrast agent could not reach the foot. (2) Angiography after the establishment of a bypass could reveal the precise image of the foot. However, differentiating between IRc and IR was still difficult, because connecting arteries were also involved in arterial disease to various degrees or the connection was composed of very fine arterioles, and it was difficult to determine whether the network could contribute blood supply to the neighbouring angiosome. (3) Because the angiosome concept had not been popularised at the time of our retrospective study, the detailed three-dimensional completion angiographies were not available in many cases. (4) Angiography itself has certain limitations and cannot demonstrate the functional or haemodynamic role of the connecting circulation between angiosomes. As we mentioned in our manuscript, indocyanine green dye is utilised to intraoperatively stain the "living angiosome" in some cases to ensure that the angiosome-indirect flow through the bypass graft can contribute to feeding neighbour angiosomes.

Furthermore, it is unpredictable whether the “choked vessel” can be opened. We sometimes experiences cases in which the choked vessel opened immediately after bypass surgery, while choked vessels opened late in some cases.

Further prospective clinical trials studying precise completion angiography and haemodynamic assessment utilising local skin perfusion pressure are needed to determine what type of patients really require angiosome-direct revascularisation. Regarding choked vessel, bypass graft is believed to directly provide high blood pressure to the foot artery, which may contribute to opening choked vessels. A clinical study should also reveal whether there is a significant difference between bypass surgery and EVT regarding the role of angiosome concept in selecting distal target of revascularisation.

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Available online 30 October 2012

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<http://dx.doi.org/10.1016/j.ejvs.2012.09.018>  
DOI of original article: <http://dx.doi.org/10.1016/j.ejvs.2012.09.019>

### Re: ‘Response to Letter to the Editor: Regional Disparities in Incidence, Handling and Outcomes of Patients with Symptomatic and Ruptured Abdominal Aortic Aneurysms in Norway’

We were pleased to read the systematic approach to disparities in the handling of ruptured abdominal aortic aneurysms in Norway and impressed that 80% of Norwegian patients presented directly to a hospital with facilities for emergency aneurysm repair.<sup>1</sup>

We too have been concerned that patients with ruptured aneurysms should have equity of access to potential life-saving aneurysm repair.

First we conducted a 3 round Delphi consensus study among emergency medicine, vascular surgery and interventional radiology specialists from England.<sup>2</sup> Based on these results, best practice guidelines for the transfer of patients with ruptured aneurysm to a specialist vascular centre have been developed and endorsed by the College of Emergency Medicine, Vascular Society and Royal College of Radiologists.<sup>3</sup> A summary of these guidelines, together with the audit target of transfer within 30 minutes of diagnosis is shown in Table 1.

**Table 1.** Summary recommendations for transfer of patients with ruptured abdominal aortic aneurysm.

1. A clinical diagnosis of ruptured abdominal aortic aneurysm (rAAA) should be considered:
  - In patients over the age of 50 years presenting with abdominal/back pain AND hypotension
  - In patients with a known AAA and symptoms of either abdominal/back pain OR hypotension/collapse
  - In patients where an alternative diagnosis is considered more likely on clinical grounds, rAAA still must be excluded, with radiological confirmation made prior to referral. *Level 3, strong recommendation*
2. Permissive hypotension is advocated for patients with a clinical diagnosis of rAAA to maintain an alert patient and systolic blood pressure >70 mm Hg is acceptable. *Level 4, strong*
3. If a specialist vascular service cannot be provided on-site the patient requires transfer to a centre with appropriate facilities and expertise. Transfer agreements with the local ambulance service should be in place. *Level 4, strong recommendation*
4. Rapid and co-ordinated transfer can reduce delays in the patient journey and improve outcome. *Level 3, strong.*  
To expedite transfer the most senior doctor available should lead and be actively involved the care of any patient with suspected rAAA. Outgoing referrals should go to a senior vascular trainee or consultant.  
*Items 5–18 below are all Level 5, with strong recommendation*
5. All patients with a clinical or radiological diagnosis of rAAA should be assessed as to their current clinical state AND pre-morbid level of function to determine suitability for transfer.
6. Patients aged <85 with no/mild/moderate systemic disease should be referred to the receiving hospital’s on-call vascular service without delay.
7. Patients age >85 or with severe systemic disease will benefit from a consultant<sup>a</sup>—consultant discussion prior to transfer to a vascular unit.
8. Impaired mental capacity is not a contraindication to assessment and transfer.
9. Patients who have been previously turned down for elective surgery should still be discussed via a consultant<sup>a</sup>—consultant referral.
10. Contraindications to transfer are restricted to those with cardiac arrest in the current admission and intubated patients. Such patients are unlikely to survive transfer and surgery.