Can ‘amputation’ be justified for arteriovenous-shunting malformations?

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It may seem odd to discuss ‘amputation’ in regard to the management of arteriovenous-shunting malformations (AVM). Unfortunately, amputation is necessary in some AVM patients after other available therapy strategies are exhausted.1–4 However, when you critically look at cases of AVM patients, many of their amputations could have been avoided or minimized, if the treating physicians had properly understood the natural history of this entity.

AVM is one of the congenital vascular malformations (CVMs) and is the consequence of defective growth mostly during the early stage of embryogenesis. It results in a lack of proper development of the capillary system allowing a direct communication between arteries and veins. AVM, as an early embryonic tissue remnant, maintains a unique characteristic which allows mesenchymal cell to continue to grow when appropriately stimulated (e.g. injury/trauma, surgery and female hormone exposure such as during menarche and pregnancy).1–4 The hemodynamic impact of its AV shunting adversely impacts the associated arteries, veins, capillaries, as well as the lymphatics and will eventually result in a potentially limb and life-threatening condition for patients if it is allowed to take its natural course with no intervention.

AVMs are different from the majority of other CVMs and have an entirely different natural clinical course. Because AVMs continue to progress, the longer one defers treatment the more complications and morbidity will occur and the more challenging it will become to control with currently available treatment modalities. Regrettfuly, many vascular specialists do not appreciate this unique nature of the AVM, and take the same conservative approach with them as they do with VM or LM, ignoring the serious potential to continue to grow into an ‘extratruncular’ lesion until it becomes ‘uncontrollable’.

An AVM will eventually cause extensive local, regional and systemic damage (e.g. complications of local severe venous hypertension, ischemic gangrene, heart failure) and should be considered a potentially limb and life-threatening condition until proven otherwise. In view of this fact, early aggressive diagnostic evaluation and treatment is recommended if there are any serious concerns about the risk of the AVM, even in very young children when feasible, before it progresses to the point of NO RETURN.1–4

Amputation may become the only practical solution when AVM advance to cause a non-functioning limb, uncontrollable bleeding or infection, or gangrene. This may be true even when it is still technically feasible to control the AVM itself with various surgical and/or non-surgical/endovascular methods.

It is important to recognize that amputation may not solve the problems caused by the AVM and also includes its own serious risks, including uncontrollable bleeding and a non-healing wound/stump. A thorough multidisciplinary review of the status of the AVM is warranted before undertaking an amputation. A precise operative plan is necessary, which may include the use of pre-amputation embolization, tourniquets, intra-arterial balloon blockage and even cardiopulmonary bypass. In addition, staged operations should be an option with consideration for ‘disarticulation rather than amputation’ to avoid if not lessen the ’dreadful’ bleeding that may from a stump!

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