Incomplete Modeling of the Thromboembolectomy Technique

To the Editor:

Dr Brekenfeld and his team are to be congratulated on their excellent study comparing the efficacy of thromboembolectomy devices. This is an important scientific comparison to make and to continue making as other devices appear on the market.

The use of the internal carotid (or ascending pharyngeal) artery and lingular artery in pigs for clot retrieval testing initially seems to be a good choice due to the anatomic similarities with the basilar and middle cerebral arteries in humans. However, some concerns must be addressed. First, these are easy angiographic targets in pigs, much easier than in the human targets that they are to simulate. The angiography presented in the article is limited, and the exact site of thrombus placement in the vessels cannot be determined without better illustrations. It is especially important in the long and tortuous lingular artery. Could the authors provide this?

Second, these vessels are different in structure and some endothelial functions compared with intracranial vessels. Important mechanical properties of the vessels are related to the histology and physiology of the artery. The absolute amount of collagen and elastin fibers, the ratio of elastin to collagen fibers, and the amount of smooth muscle in the media play an important role in vessel elasticity and flow through the artery. Differences from humans have been shown in several animals including the rat, rabbit, and dog carotid arteries which demonstrate quite different elastic moduli. Increases in wall thickness from human atherosclerotic disease and hypertension cause further changes in these biomechanical properties as well.

Differences have been demonstrated in endothelial functions, neurochemical receptors, and the tunica media myocyte properties (resting membrane potential) between intracranial arteries and visceral arteries in other animal models and probably apply in pigs as well. For example, cats and guinea pigs demonstrate different resting potentials of the intracranial arterial myocytes in pigs as well. For example, cats and guinea pigs demonstrate different resting potentials of the intracranial arterial myocytes in pigs as well. For example, cats and guinea pigs demonstrate different resting potentials of the intracranial arterial myocytes in pigs as well. For example, cats and guinea pigs demonstrate different resting potentials of the intracranial arterial myocytes in pigs as well. Therefore, it is to be expected that these pig vessels will respond differently from fragile human intracranial vessels with regard to irritability, perforation, and spasm.

The authors properly mentioned as a limitation the vasospasm differences and structural differences between pigs and humans. These very important points may explain the lack of perforations and dissections in this pig study and greatly weakens the comparison with humans as far as spasm and other complications are concerned.

Comparison of mechanical success with these devices remains quite important and appears reasonably sound as presented but could be performed in many vascular sites. Indeed, any arteries such as visceral, renal, or extremity arteries in the pig might perform equally. Because intracranial vessels in the pig are not accessible, the search for a complete animal model should continue and other large animal possibilities should still be considered.

Disclosures

None.

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