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Stroke mechanical thrombectomy *ex vivo* simulation model: Face, content, construct and concurrent validity

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Background: Stroke mechanical thrombectomy has gained attention in recent years, with interventional window being recently extended to 24 hours reported in the DAWN trial. Experience and technical knowledge are key components for positive results with reduced complications. Only live pig model has been described for acute MCA thrombolectomy, but ethical issues, cost, availability and thrombus simulation are drawbacks for this simulator. Validation studies have proved the similarity of human placenta simulators to real procedures.

Objective: Development and validation of a high fidelity, affordable and available simulator for stroke mechanical thrombolectomy.

Method: An *ex vivo* hybrid human and bovine placenta training model has been developed for acute endovascular mechanical thrombectomy. Thrombus placement was done in large and small caliber vessels, bifurcation and trifurcation with different thrombus consistence. The proposed simulator was taken to angio room, after ethical committee approval, and the following tasks were simulated: femoral artery puncture, catheter progression through arteries, navigation into the carotid artery, arteriography, thrombus localization, thrombolectomy, arteriography and catheter removal. The simulator was face, contented, construct and concurrent validated.

Result: The simulator showed high degree of similarity, face validity. All part tasks were reproduced with excellent content validity. Performance while working in the simulator was statistically different between experienced and novice endovascular doctors (construct validity). Comparison to the pig model highlighted advantages and disadvantages of each one (concurrent validity).

Conclusion: *Ex vivo* hybrid simulator for stroke mechanical thrombolectomy showed positive validation, with promising teaching and training qualities to be used by interventional neuro-radiologists fellows and staff.

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