World Lipedema Congress, Rome 2025

Phlebology Relevant Considerations in Lipoedema Surgery: Venous Pathways R -> L Shunt (PFO / ASD), & Stroke. Dr Chris Lekich.

Poster Citations

1. Kent DM, Wang AY. Patent Foramen Ovale and Stroke: A Review. JAMA. Published online July 28, 2025. doi:10.1001/jama.2025.10946
   Summary parallels –
   - Prevalence & mechanism: PFO present in ~25% of adults; enables paradoxical embolism. ~5% of all strokes—and ~10% in younger patients—are attributable to paradoxical embolism.
   - Cryptogenic stroke link: In ≤60-year-olds with embolic stroke of undetermined source, ~50% have a PFO (vs 25% baseline).
   - Closure efficacy: Pooled 6-trial data (n=3740; median 57 months) shows lower recurrent stroke with closure (0.47%/yr) vs medical therapy (1.09%/yr); aHR 0.41.

2. Zhang D, Jiang L, Chen YN, Pan MF. The diagnostic value of contrast-enhanced transcranial Doppler and contrast-enhanced transthoracic echocardiography for right to left shunt in patent foramen ovale: a systematic review and meta-analysis. Front Neurol. 2024 Aug 2;15:1447964. doi: 10.3389/fneur.2024.1447964. PMID: 39157064; PMCID: PMC11327031.
   Summary— PFO screening tests
   - c-TCD (bubble): Pooled sensitivity 0.91, specificity 0.87, AUC 0.968 → best for *detecting* R→L shunt; non-invasive, outpatient.
   - c-TTE (bubble): Sensitivity 0.86, specificity 0.88, AUC 0.953 → good screen, slightly less sensitive than c-TCD.
   - TEE/TOE (bubble): Gold standard for anatomy, sizing, and closure planning; invasive and not ideal for population screening.
   - Practical order (detection → anatomy): c-TCD first-line → c-TTE if TCD window unavailable/poor → TEE/TOE when positive/high suspicion to characterise PFO/ASA and plan management.
   - If R to L shunt is positive but no PFO on TEE/guidewire, treat a pulmonary source (e.g., PAVM) as likely and confirm with chest CT/CTpa. Saboo SS, Chamarthy M, Bhalla S, Park H, Sutphin P, Kay F, Battaile J, Kalva SP. Pulmonary arteriovenous malformations: diagnosis. Cardiovasc Diagn Ther. 2018 Jun;8(3):325-337. doi: 10.21037/cdt.2018.06.01. PMID: 30057879; PMCID: PMC6039795.

There is no specific research on PFOs and stroke risk for Lipoedema surgeries. The below citations draw on relevant parallel publications.

3. PFO matters for stroke: PFO is present in ~25–27% of adults and is over-represented in cryptogenic stroke; in selected patients, closure lowers recurrent stroke vs medical therapy. Hagen PT, Scholz DG, Edwards WD. Incidence and size of patent foramen ovale during the first 10 decades of life: an autopsy study

of 965 normal hearts. *Mayo Clin Proc*. 1984;59(1):17-20. doi:10.1016/S0025-6196(12)60336-X. PMID: 6694427.

4. Liposuction → fat emboli: Fat embolism after liposuction is rare but well-documented, including cases of fat embolism syndrome causing death and cerebral damage (cerebral petechial hemorrhages and vascular fat emboli). consistent with ischemic/hemorrhagic brain injury. Cantu CA, Pavlisko EN. Liposuction-Induced Fat Embolism Syndrome: A Brief Review and Postmortem Diagnostic Approach. *Arch Pathol Lab Med*. 2018;142(7):871-875. doi:10.5858/arpa.2017-0117-RS. PMID: 29939780.
5. Parallel from diving: PFO-related R→L shunt increases risk of neurological decompression illness; targeted screening is advised for high-risk subgroups (ivers with a history of cerebral, spinal, inner-ear or cutaneous decompression illness, migraine with aura, a family history of PFO or atrial septal defect and those with other forms of congenital heart disease are considered to be at higher risk. For these individuals, screening should be considered). Smart D, Mitchell S, Wilmshurst P, Turner M, Banham N. Joint position statement on persistent foramen ovale (PFO) and diving (SPUMS/UKSDMC). *Diving Hyperb Med*. 2015;45(2):129-131. PMID: 26165538.
6. Peri-operative signal: PFO is associated with higher peri-operative stroke in non-cardiac surgery (systematic review/meta-analysis). Rais G, Vassallo P, Schorer R, Bollen Pinto B, Putzu A. Patent foramen ovale and perioperative stroke in noncardiac surgery: a systematic review and meta-analysis. Br J Anaesth. 2022 Dec;129(6):898-908. doi: 10.1016/j.bja.2022.06.036. Epub 2022 Aug 18. PMID: 35987705.
7. In liposuction, a PFO can let venous fat emboli bypass the lungs (R→L) and hit the brain—escalating cerebral fat embolism risk; FES also includes life-threatening pulmonary fat embolism and ophthalmic/central retinal artery occlusion causing sudden blindness. Fat embolism syndrome: a review in cosmetic surgery. *Kosin Med J*. 2024;39(3):169-178. doi:10.7180/kmj.24.126.
8. In a 17-year-old with long-bone fracture and cerebral fat embolism, percutaneous PFO closure reduced TCD-detected microemboli and enabled uneventful fixation; concluding if a PFO is present, closing it before fracture surgery is feasible and may protect against massive systemic embolization. Forteza AM, Rabinstein A, Koch S, et al. Endovascular closure of a patent foramen ovale in fat embolism syndrome: changes in embolic patterns detected by transcranial Doppler. *Arch Neurol*. 2002;59(3):455-459. doi:10.1001/archneur.59.3.455.
9. Reviews PFO in cryptogenic stroke: mechanisms, over-representation in younger patients, and high-risk features (large shunt, ASA) that support closure in selected cases. Nakanishi K, Yoshiyama M, Homma S. Patent foramen ovale and cryptogenic stroke. *Trends Cardiovasc Med*. 2017;27(8):575-581. doi:10.1016/j.tcm.2017.06.016. PMID: 28709812..
10. Liposuction can seed venous fat microdroplets that if a right-to-left shunt is present, bypass the lung and reach brain, retinal and whole body vascular arterial beds: droplets around 7–10 µm can lodge in 5–10 µm capillaries, aggregates can affect 10–100 µm arterioles, and larger emboli traversing a clinically sizeable PFO (~2–10 mm) could threaten proximal cerebral vessels

(e.g., ~3 mm MCA origin). Even without overt stroke, such microembolisation may cause neurocognitive injury and diffuse end-organ injury (e.g., hypoxaemia from pulmonary microembolism, retinal ischaemic changes, petechial skin signs, renal and liver dysfunction). In our setting, contrast TCD has been a safe, seamless first-line to identify large, haemodynamically significant right-to-left shunts. Accordingly, it is proposed that risk-stratified preoperative assessment for high-risk procedures such as lipoedema liposuction is undertaken as a screen and framed by duty-of-care and medicolegal considerations with full consenting outlinig the consequences of a missed significant right to left shunt/PFO. Laur G, Lekich C. The whole truth of liposuction and a hole in the heart. *J Phlebology & Lymphology*. 2021;14(6):1-5.

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