determine significant reduction in midline shift and SDH volume. Multivariate analysis was performed using logistic and linear regression for percent improvement from baseline volume.

**Results** Across 81 patients and 98 cSDHs, the mean initial SDH volume was 66.54 mL (SD: 34.67 mL), with the mean midline shift as 3.79 mm (SD: 2.85 mm). There was a significant mean reduction in SDH volume post-operatively (12.1 mL (95% CI: 9.32 - 14.27 mL), p < 0.001). There was also a significant mean reduction in midline shift (0.8 mm (95% CI: 0.24 - 1.36 mm), p = 0.006). 22% of patients had a reduction of over 30% in the immediate post-operative period. A multivariate analysis of 36 patients was performed. There were no significant parameters observed influencing degree of reduction.

**Discussion** MMA embolization is a safe, and effective approach for the management of cSDH patients. We show a significant reduction of hematoma volume and reduction of midline shift even in the acute post-operative period. Larger studies, randomized trials, and longer-term studies are needed to confirm these findings.


### E-080 LESSONS FROM THE OTHER SIDE: THE ORIGINS AND EVOLUTION OF TRANSVENOUS TECHNIQUES IN NEUROINTERVENTIONAL SURGERY

**Introduction/Purpose** Neurointerventional surgery emerged in the early 1960s, when Lusenhop and Spence described the first intravascular embolization of a cerebral arteriovenous malformation. Since then, neuroendovascular techniques have grown exponentially, becoming the standard of care for many pathologies. To date, this growth has been attributed largely to transarterial techniques; however, there has been a resurgence of interest in transvenous (TV) neurointerventional methods, driven by a groundswell in technical innovation and advances in knowledge of the role of the cerebral venous system in health and disease. The purpose of this historical review is to chronicle the origins and evolution of TV neurointervention by highlighting seminal achievements, technical breakthroughs, and controversies, all of which shape the phylogeny of TV techniques in the modern era.

**Methods** A systematic review of seminal papers in TV neurointervention was performed using Google Scholar and Medline indices, following PRISMA guidelines. The search strategy sought to identify landmark manuscripts describing TV neurointerventional techniques in three pathophysiologic states: 1) arteriovenous shunts 2) cerebral venous thrombotic disease 3) disorders of intracranial pressure homeostasis. Reference lists of selected articles were also reviewed for additional potential citations.

**Results** Foundational manuscripts in each of the three disease categories were identified: The genesis of therapeutic TV neurointerventional surgery can be traced to 1981, when Debrun et al. described TV occlusion of direct carotid-cavernous fistulas via detachable balloons. In 1986, Mickle and Quisling performed the first TV embolization of Vein of Galen malformation, representing the first TV therapy in a child. In 1989, Halbach et al. demonstrated efficacy of TV embolization for dural arteriovenous fistulas. In 1995, King et al. identified cerebral venous stenosis as the culprit for idiopathic intracranial hypertension (IIH), with innovative use of TV manometry. The first application of rheolytic venous sinus thrombectomy was reported by Dowd et al. in 1999. In 2002, Higgins et al demonstrated efficacy of TV stenting in IIH. These, and other landmark innovations are the direct antecedents of ongoing revolutions in TV therapy including AVM embolization, CSF-diversion, and embolization of CSF-venous shunts.

**Conclusions** Pioneering work in the 1980s and 1990s paved the way for modern transvenous neurointervention. Despite the relative paucity of literature investigating transvenous approaches, their role in disease management has been clearly established and is expected to grow considerably. Therefore, the importance of transvenous skills for contemporary neurointerventionalist cannot be understated.