Outcome of Carotid-Cavernous Fistula Embolization with Onyx Via Transvenous, Transarterial & Direct Approaches

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Abstract

Purpose: Carotid-Cavernous Fistula (CCF) is an abnormal communication between the carotid artery (CA) and cavernous sinus (CS). Endovascular surgery is currently considered the safest and most effective management. Recently Onyx, a non-adhesive liquid embolic copolymer dissolved in dimethyl-sulfoxide is used to treat CCF. We aim to evaluate the outcome of using Onyx to treat CCF using 3 different approaches: transvenous, transarterial and percutaneous.

Material and Methods: 13 patients were examined and preembolization angiograms were performed in all patients. 8 cases performed via transvenous embolization: Percutaneous femoral vein and artery access were obtained. Onyx was injected in the CS after the catheters were maneuvered to the inferior petrosal sinus or facial vein and internal CA. 4 cases performed via transarterial embolization: Femoral artery was accessed. Onyx was injected in the CS after the catheter was maneuvered to the CA with selective catheterization of the feeding vessels. 1 case performed via percutaneous approach: Femoral artery was accessed and a catheter was maneuvered to the CA. A 3-D CT reconstruction of the skull was obtained for better localization. A spinal needle was inserted percutaneously at the inferior orbital rim and advanced towards the superior orbital fissure under fluoroscopic guidance with overlay of the CT. The needle was advanced until arterial blood was obtained. Onyx was injected in the CS once adequate positioning was confirmed. Additional use of coils was implemented in high-flow fistulas. All patients were followed up to determine outcome and assess for complications.

Results: Immediate complete fistula obliteration was achieved in all patients confirmed by angiogram. There was 100% resolution of presenting symptoms within 2 months.
patients had complications: 1 permanent nerve palsy via transarterial approach, 1 transient nerve palsy via transarterial approach and 1 transient Horner syndrome with partial nerve palsy via transvenous embolization. Conclusions: Non-surgical radiologic approaches to treat CCF using Onyx via transvenous, transarterial and percutaneous embolization are effective methods but complications may occur.