Abstract

A 45-year-old female referred for a large carotid body tumor resection. The tumor was encasing the internal (ICA) and external carotid arteries (ECA). She underwent angiography and embolization of the ascending pharyngeal artery and a distal branch of the ECA using ethylene vinyl-alcohol copolymer (EVOH). Two days later, surgical resection of the tumor with regional lymph node dissection was performed along with an interposition reversed vein graft anastomosis between the mid common carotid and distal ICA. Devascularization of carotid body tumor can be performed using EVOH delivered through trans-arterial and percutaneous routes. Embolization may facilitate surgical resection and decrease blood loss but does not decrease the rate of neurological complications. Embolization can be performed by the vascular surgeon before a large carotid body tumor resection with minimal migration and or stroke risk.

Case Report

A 45-year-old female referred for a slow growing painless left neck swelling for last 5 years. There were no symptoms of cranial nerve involvement or dysphagia. Physical examination showed a large non-tender left neck mass extending from about 4 cm above the clavicle to the angle of the mandible. Computerized axial tomography scan and magnetic resonance imaging confirmed a 6.2×5.4×5.2 cm carotid body tumor at the carotid bifurcation completely encasing internal (ICA) and external carotid arteries (ECA) (Figure 1A).

Step 1: Embolization using ethylene vinyl-alcohol copolymer

Patient underwent angiogram (Figure 1B) and embolization of the ascending pharyngeal artery and a distal branch of the ECA using ethylene vinyl-alcohol copolymer (EVOH) (Onyx®)

Step 2: Surgical tumor resection and vascular reconstruction

Two days later, under evoked potential monitoring, surgical resection of the tumor (Figure 1D) with regional lymph node dissection was performed as follows.

Discussion

Carotid body tumors are rare benign vascular neoplasms arising from the small chemoreceptor organ in the adventitia of the CCA bifurcation. Smaller tumors not encasing the vessels (Shamblin I) may be treated with radiation but surgical resection remains the treatment of choice for tumors partially (Shamblin II) or completely (Shamblin III) encasing the vessels. Due to proximity of nerves, the rate of neurological complications is higher with tumors of higher Shamblin groups.1 Devascularization of the tumor can be

References

safely and effectively performed using embolysate delivered through transarterial² and percutaneous³ (direct injection into the tumor) routes.

One of the concerns for embolization is inadequate devascularization,² another is embolysate migration² into ICA causing stroke. Failure to identify and embolize all feeders can lead to inadequate devascularization.

The embolization technique described in our case report is mainly intended to reduce blood loss. However, our patient experienced 800 cc blood loss despite embolization. We believe that blood loss may have been higher if embolization was not performed. There could be several potential reasons for more than average blood loss including large hyper-vascular tumor, failure to identify and embolize all feeders and not using enough ETOH to devascularize the tumor. Abdel-Aziz et al. has shown that percutaneous tumor embolization may achieve a higher degree of devascularization.⁴ However, we were concerned about any over flow that might leak into the ICA and cause a stroke due to the nature of the copolymer, which cannot be captured in any distal embolic protection device (Filter).

In our case, migration was avoided by direct visualization of vessels during embolization procedure utilizing fluoroscopy fade technique.³ Embolization may facilitate surgical resection and decrease blood loss but does not reduce the rate of neurological complications.⁵ Acrylic glue, endovascular coils or EVOH can be utilized for pre-operative embolization. EVOH may be easier to use and may have better tumor penetration because it can be injected slowly for precise delivery into the feeding vessels² compared to acrylic glue, which polymerize immediately on contact with blood. Embolization can be safely performed by the treating vascular surgeon to devascularize a large carotid body tumor with minimal risk of migration and stroke.

**Recommendations**

- A standard guideline needs to be setup about the amount of copolymer needed to embolize according to the tumor size before surgical resection.
- A follow-up angiogram a day or two after embolization to confirm adequate devascularization of the tumor prior to surgical resection may be helpful in reducing excessive blood loss and avoiding any serious intra-operative complications.

**References**