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OVERVIEW

Vascular embolization procedures allow blockage of blood vessels without invasive surgery. Vascular embolization can be used to stop arterial bleeding and can also be used to block blood vessels for other reasons, such as to treat tumors, shrink vascular malformations, or re-direct flow.

This policy does not address vascular embolization for the liver or uterine fibroids. Please refer to the Prior Authorization via Web-Based Tool for Procedures policy, listed in the Related Policies section.

MEDICAL CRITERIA

The following procedures are considered medically necessary for both Medicare Advantage Plans and Commercial Products:

1. Coil embolization in the treatment of arterio-venous malformations (AVMs)/aneurysm, congenital aorto-azygous fistula, and splenic artery aneurysm
2. Coil embolization of gastric varices
3. Embolization for the treatment of lower gastro-intestinal bleeding
4. Embolization (coil, microsphere, glue, or other agents) for the treatment of renal angiomyolipoma (AML) if there is active bleeding, or the size of the renal AML is greater than 6 cm
5. Endovascular embolization for an extracranial AVM or fistula
6. Geniculate artery embolization for knee hemarthrosis following total knee arthroplasty if member has failed conservative therapies (e.g., ice, immobilization, compression, saline lavage, corticosteroid instillation, and selective COX-2 inhibitors); and demonstrated synovial hyper-vascularity on angiography
7. Portal vein embolization before surgical resection of cholangiocarcinoma
8. Splenic artery embolization for the treatment of hyper-splenism secondary to hepatic cirrhosis as an alternative to splenectomy
9. Transcatheter arterial embolization for non-variceal upper gastrointestinal bleeding
10. Transcatheter embolization (embolotherapy) in the treatment of intractable or recurrent severe posterior epistaxis when conservative measures have failed
11. Transcatheter embolization for the treatment of lower gastrointestinal bleeding (GIB) in persons for whom a bleeding scan has identified the lower gastrointestinal tract as the source of GIB and ANY of the following criteria are met:
 - a. For a hemodynamically unstable person with active lower GIB or a person who has required greater than 4units of blood within 24 hours; or
 - b. For a person with ongoing or recurrent lower GIB where colonoscopy has localized the bleeding site and treatment was attempted; or
 - c. In a hemodynamically stable person with obscure (nonlocalized) recurrent lower GIB, assuming a prior negative adequate colonoscopy and upper gastrointestinal endoscopy
12. Vascular embolization for the treatment of type I/type II endovascular leak.
13. Pre-operative embolization of skull base meningiomas
14. Renal artery embolization/angioinfarction, as a pre-operative adjunct to nephrectomy, in the treatment of persons with large, hypervascular renal cell carcinomas
15. Selective arterial embolization for the treatment of giant cell tumor

16. Tumor embolization or pre-operative tumor embolization to reduce intra-operative bleeding prior to surgical resection in the treatment of hypervascular tumors or metastases from hypervascular tumors
17. TACE or TAE as therapeutic interventions for actively bleeding malignant or nonmalignant lesions.
18. Persistent gross hematuria originating from the prostate

For procedures or conditions not addressed in this policy, please refer to the Medical Necessity policy, listed in the Related Policies section.

PRIOR AUTHORIZATION

Prior authorization is required for Medicare Advantage Plans and is recommended for Commercial Products via the web-based tool for participating providers. Refer to the Related Policies section, below.

POLICY STATEMENT

Medicare Advantage Plans and Commercial Products

Vascular embolization procedures are considered medically necessary when the medical criteria, above, are met.

Because the CPT codes used to represent embolization procedures are not specific to any one particular body-region or medical condition, medical necessity review is needed to determine specifically what procedure is being performed and for what condition. During the medical necessity review process, the following procedures are considered not covered for Medicare Advantage Plans and not medically necessary for Commercial Products as the evidence is insufficient to determine the effects of the technology on outcomes:

1. Coil embolization for treatment of left ventricular outflow tract (LVOT) pseudoaneurysm
2. Embolization for locoregional treatment of metastatic pancreatic cancer
3. Embolization for the treatment of asymptomatic persistent sciatic artery
4. Endovascular embolization in the treatment of spinal dural arteriovenous fistula
5. Genicular artery embolization for the treatment of osteoarthritis related knee pain
6. Hemorrhoidal embolization (HydroPearl microspheres)
7. HydroPearl microspheres for the treatment of AVMs in the lower extremity
8. Bariatric arterial embolization to treat obesity
9. Middle meningeal artery embolization for chronic subdural hematoma
10. Paraumbilical vein coil embolization for the treatment of hepatic encephalopathy
11. Pre-operative embolization for carotid body tumor resection
12. Pre-operative embolization of the inferior mesenteric artery to reduce the rate of type II endoleak following endovascular abdominal aortic aneurysm repair.
13. Prostatic arterial embolization for benign prostatic hyperplasia.

For procedures or conditions not addressed in this policy, please refer to the Medical Necessity policy, listed in the Related Policies section.

COVERAGE

Benefits may vary between groups/contracts. Please refer to the Evidence of Coverage or Subscriber Agreement for applicable not medically necessary/not covered benefits/coverage

BACKGROUND

Vascular embolization procedures allow blockage of blood vessels without invasive surgery. Vascular embolization can be used to stop arterial bleeding and can also be used to block blood vessels for other reasons, such as to treat tumors, shrink vascular malformations, or re-direct flow.

Coil Embolization for the Treatment of Arterio-Venous Malformations (AVMs) / Aneurysm

Jiang and colleagues (2021) stated that whether the use of endovascular embolization could provide additional benefits in patients treated with stereotactic radiosurgery (SRS) for intracranial arterio-venous malformations (IAVMs) remains controversial. In a meta-analysis, these researchers examined the safety and efficacy of SRS with and without prior endovascular embolization in patients with IAVMs. The authors stated that this study

had several drawbacks. First, most included studies (17/19) had a retrospective, observational design, and the conclusions of this study were based on lower evidence level, which should be interpreted cautiously. Second, the disease status and experience of the clinician were different across included studies, which could affect the prognosis of IAVMs. Third, the heterogeneity across included studies was not fully explained using sensitivity and subgroup analyses, which restricted the reliability of pooled conclusions. Fourth, the background therapeutic options and rehabilitation strategies were not addressed, which could affect the treatment effects between groups for the mid-term and long-term outcomes. Finally, the inherent limitations of the meta-analysis based on published articles included publication bias and analysis based on pooled data. Thompson et al, 2015 support treatment of intra-cranial aneurysms if they are enlarging. The guidelines note that endovascular coiling is an effective treatment for select unruptured intracranial aneurysms (UIAs) that are considered for treatment (Class IIa; Level of Evidence B); endovascular coiling is associated with a reduction in procedural morbidity and mortality over surgical clipping in selected cases but has an overall higher risk of recurrence (Class IIb; Level of Evidence B). The evidence is sufficient to determine the effects of the technology on health outcomes.

Coil Embolization for the Treatment of Congenital Aorto-Azygous Fistula

Recto and Elbl (2001) concluded that transcatheter coil embolization therapy was safe and should be considered as a therapeutic option for patients who have moderate-to-large systemic AV fistulas. Ishii et al (2003) concluded that a vein-to-vein shunt is an important cause of protein-losing enteropathy, and when it is recognized, coil embolization should be selected as an effective treatment. Romero et al (2006) concluded that available data in the literature suggested that coil embolization of aorto-azygous fistulas was usually successful. The evidence is sufficient to determine the effects of the technology on health outcomes.

Gastric Variceal Embolization

Bazarbashi et al (2020) noted that gastric variceal (GV) bleeding is a feared complication of cirrhosis. Traditional endoscopic treatment with cyanoacrylate (CYA) injection can be challenging. Alternatively, endoscopic ultrasound (EUS)-guided delivery of hemostatic coils has shown high therapeutic success without the complications profile of CYA alone. These researchers compared the clinical outcomes of EUS-guided coil embolization with endoscopic CYA injection for the treatment of GV. Technical success was 100 % for EUS coil therapy versus 96.7 % for CYA injection ($p = 1.0$). Complication rates were 10 % in the EUS coil group versus 20% in the CYA group ($p = 0.65$). At 9 months, no EUS coil patient had rebled compared with 38 % of the CYA group. The authors concluded that compared with CYA, EUS-guided coil injection appeared superior for the treatment of GV and should be considered initial endoscopic treatment of choice in centers with interventional EUS expertise.

Endovascular embolization for an extracranial AVM or fistula

Kirkwood (2015) states that “Options for endovascular repair include bare metal stent placement with or without trans-stent coil embolization of the aneurysm sac, exclusion of the aneurysm using a stent-graft, or endovascular occlusion of the carotid artery. Features favoring an endovascular approach include pseudoaneurysm related to trauma, aneurysm of the distal internal carotid artery, and hostile neck anatomy”. Furthermore, guidelines on “The management of patients with unruptured intracranial aneurysms” from the American Heart Association/American Stroke Association (Thompson et al, 2015) support treatment of intracranial aneurysms if they are enlarging. The guidelines note that endovascular coiling is an effective treatment for select unruptured intracranial aneurysms (UIAs) that are considered for treatment (Class IIa; Level of Evidence B); endovascular coiling is associated with a reduction in procedural morbidity and mortality over surgical clipping in selected cases but has an overall higher risk of recurrence (Class IIb; Level of Evidence B).

Based on the clinical evidence, endovascular embolization is an acceptable treatment modality for an extracranial AVM or fistula. The evidence is sufficient to determine the effects of the technology on health outcomes.

Geniculate Artery Embolization for Knee Hemarthrosis Following Total Knee Arthroplasty (TKA)

van Baardewijk et al (2018) conducted a study and concluded that embolization of the geniculate arteries in was a safe and effective treatment of recurrent spontaneous hemarthrosis following TKA. Although these

researchers had performed a substantial number of re-interventions, results of this study showed that this procedure could be safely repeated without adverse events. They stated that these findings indicated that embolization could possibly be the treatment of choice when conservative measures failed and can be repeated in the event of recurrent or persistent symptoms. The evidence is sufficient to determine the effects of the technology on health outcomes.

Splenic Artery Embolization for the Treatment of Hyper-Splenism Secondary to Hepatic Cirrhosis

Although the individual study numbers are small, the total studied over several years is significant and the evidence has demonstrated that coil embolization in the treatment of splenic artery aneurysms is safe and effective and may induce less morbidity than open surgery, in particular by preserving the spleen. In a meta-analysis, Wang and colleagues (2017) examined the effectiveness of partial spleen arterial embolization (PSAE) in the treatment of hypersplenism due to hepatic cirrhosis. Authors concluded that PSAE is a minimally-invasive therapy, which can be applied to treat hypersplenism secondary to hepatic cirrhosis effectively, particularly for patients with a poor overall condition. The evidence is sufficient to determine the effects of the technology on health outcomes.

Transcatheter Arterial Embolization for Non-Variceal Upper Gastro-Intestinal Bleeding

Tarasconi and colleagues (2019) noted that very few patients with nonvariceal upper gastro-intestinal (GI) bleeding fail endoscopic hemostasis (refractory NVUGIB). This subset of patients poses a clinical dilemma: should they be operated on or referred to transcatheter arterial embolization (TAE)? These researchers performed a systematic review of the literature and carried out a meta-analysis of studies that directly compared TAE and surgery in patients with refractory NVUGIB. The authors concluded that the findings of this study showed that TAE was a safe and effective procedure; when compared to surgery; TAE exhibited a higher re-bleeding rate, but this tendency did not affect the clinical outcome as shown by the comparison of mortality rates (slight drift toward lower mortality for patients undergoing TAE). The present study suggested that TAE could be a viable option for the 1st-line therapy of refractory NVUGIB and set the foundation for the design of future randomized clinical trials. Another issue that needs to be addressed in the future is the best therapeutic option for refractory NVUGIB in hemodynamically unstable patients. The evidence is sufficient to determine the effects of the technology on health outcomes.

Embolization for the Treatment of Renal Angiomyolipoma (rAML)

Torres and Pei (2024) states that “Patients with a renal angiomyolipoma (AML) who develop flank pain or tenderness, or gross hematuria should undergo prompt imaging with computed tomography (CT) or magnetic resonance imaging (MRI) to assess for hemorrhage. Patients who develop active bleeding should receive resuscitative measures (if hemodynamically unstable) and, if feasible, undergo prompt angiography and selective artery embolization (SAE) to stop the bleeding. Patients who cannot have SAE, or who continue to have life-threatening hemorrhage from a renal AML after an attempt at SAE, should undergo a partial or complete nephrectomy... Imaging and other features that are associated with a higher risk of bleeding include: AML diameter > 6 cm”. The evidence is sufficient to determine the effects of the technology on health outcomes.

Embolization for the Treatment of Lower Gastro-Intestinal Bleeding

Strate (2024) states that “Transcatheter embolization is a means of controlling hemorrhage and has largely replaced other temporizing interventions such as vasopressin infusion. Super-selective embolization of distal vessels using coaxial catheters decreases the risk of bowel infarction. A meta-analysis found that in patients with active bleeding, super-selective embolization is feasible in 98 %, and complications occur in 4.6 %, most commonly bowel infarction or ulceration”. Kruskal and Collares (2024) states that “Angiographic therapies include the infusion of vasoconstricting medications or the delivery of agents to mechanically occlude the vascular supply of the bleeding lesion (embolization). Agents used for embolization include biodegradable gelatin sponge, polyvinyl alcohol particles, liquid agents such as glue and ethylene-vinyl alcohol copolymer, and metallic coils. Super-selective transcatheter embolization with microcoils is the primary endovascular treatment option for lower GI bleeding. Endovascular treatment of upper GI bleeding is usually performed with a combination of coils, gelatin sponge, and/or particles”. The evidence is sufficient to determine the effects of the technology on health outcomes.

Transcatheter Embolization for Lower Gastrointestinal Bleeding (GIB)

Kruskal and Collares (2024) concluded that "Angiographic control of nonvariceal gastrointestinal bleeding in adults" include massive lower gastrointestinal (GI) bleeding (transfusion requirement of 4 units of blood or more in 24 hours) as indication for embolization. Furthermore, the authors assert that embolization should be considered a primary method for treating lower GI bleeding although vasopressin infusion has a fairly comparable efficacy to embolization. The authors also state that super-selective transcatheter embolization with micro-coils is the main endovascular treatment option for lower GI bleeding. The evidence is sufficient to determine the effects of the technology on health outcomes.

Portal Vein Embolization (PVE) Before Surgical Resection of Cholangiocarcinoma

Kumar (2021) states that "Preoperative PVE is primarily indicated when a marginal FLR precludes an otherwise potentially curative hepatectomy in selected patients with primary or metastatic liver tumors... In properly selected patients, preoperative PVE increases resectability rates and reduces the incidence of post-hepatectomy liver failure. Approximately 70 to 80 % of patients who undergo preoperative PVE eventually undergo successful liver resection. Although the timing of hepatic resection varies, hepatic surgeons generally wait 3 to 6 weeks post-PVE before undertaking resection". The evidence is sufficient to determine the effects of the technology on health outcomes.

Transcatheter Embolization in the Treatment of Intractable or Recurrent Severe Posterior Epistaxis

Based on the clinical evidence, transcatheter embolization (embolotherapy) is an acceptable alternative in the treatment of intractable or recurrent severe posterior epistaxis when conservative measures have failed. The evidence is sufficient to determine the effects of the technology on health outcomes.

Prostatic Arterial Embolization (PAE) for Hematuria

Tian et al (2019) concluded that PAE is safe and effective and is a reasonable choice of treatment for gross BPH induced gross hematuria refractory to medical management for at least 3 months in patients who are not candidates for surgery or refuse surgery. The evidence is sufficient to determine the effects of the technology on health outcomes.

Vascular Embolization for the Treatment of Type I/Type II Endovascular Leak.

Clinical evidence shows that fibrin glue sac embolization to eliminate type I endoleak after endovascular aneurysm repair (EVAR) yielded excellent results, effectively and durably resolving the leaks. In a systematic review and meta-analysis, Zhang and colleagues (2021) examined the effect of preventive collateral arteries embolization before endovascular aneurysm repair (EVAR) to reduce type II endoleaks, aneurysm enlargement, and re-interventions. These researchers carried out a comprehensive search to identify articles related to preventive collateral arteries embolization before EVAR. A total of 12 relevant studies, including 11 retrospective studies and 1 RCT, were identified and fulfilled the specified inclusion criteria. A total of 1,706 patients in 11 studies were involved in the meta-analysis. The authors concluded that collateral arteries embolization is a promising approach to prevent the occurrence of type II endoleaks, sac enlargement, and re-intervention. Moreover, these researchers stated that high-quality studies are needed to provide stronger evidence-based medical suggestions regarding the effectiveness of this approach. The evidence is insufficient to determine the effects of the technology on health outcomes.

Pre-Operative Embolization of Skull Base Meningiomas

Ilyas and colleagues (2019) stated that neoadjuvant endovascular pre-operative embolization for appropriately selected skull base meningiomas may facilitate surgical resection, thus, potentially decreasing operative morbidity. The authors also concluded that future comparative analyses are needed to determine the benefits of pre-operative EMB of skull base meningiomas with respect to extent of resection, operative duration, operative blood loss, and surgical morbidity. The evidence is sufficient to determine the effects of the technology on health outcomes.

Renal Artery Embolization

Based on the clinical evidence, renal artery embolization/angioinfarction, as a pre-operative adjunct to nephrectomy, is an acceptable alternative in the treatment of patients with large, hypervascular renal cell carcinomas. The evidence is sufficient to determine the effects of the technology on health outcomes.

Selective Arterial Embolization for the Treatment of Giant Cell Tumor

Guidelines on giant cell tumor of the bone from the National Comprehensive Cancer Network (2018) state that "[s]erial arterial embolizations have been shown to be effective in the management of patients with giant cell tumors of the extremities, especially for tumors with large cortical defects and joint involvement and for those with large giant cell tumors of the sacrum." The evidence is sufficient to determine the effects of the technology on health outcomes.

Tumor Embolization of Hypervascular Tumors

A hypervascular tumor is a tumor characterized by an abnormal increase in blood vessel growth in the area. These vessels feed the tumor cells, and may be characterized by abnormal connections between veins and arteries. Hypervascular tumors may be benign (meningiomas, osteoblastomas, chondromas), malignant (renal cell carcinoma, thyroid carcinoma, hepatocellular carcinoma, glomus tumor) or metastatic tumors from these primary sites (list is not all-inclusive). Tumor embolization or pre-operative tumor embolization to reduce intraoperative bleeding prior to surgical resection may be considered medically necessary in the treatment of hypervascular tumors or metastases from hypervascular tumors. The evidence is sufficient to determine the effects of the technology on health outcomes.

Embolization for Locoregional Treatment of Metastatic Pancreatic Cancer

Timmer and colleagues (2021) stated that the prognosis of metastatic pancreatic ductal adenocarcinoma (mPDAC) remains universally poor, requiring new and innovative therapeutic approaches. In a subset of oligometastatic PDAC patients, locoregional therapy, in addition to systemic chemotherapy, may improve survival. In a systematic review, these researchers examined available evidence on locoregional treatments for mPDAC. They carried out a systematic literature search on locoregional techniques, including resection, ablation and embolization, for mPDAC with a focus on hepatic and pulmonary metastases. A total of 59 studies were identified, including 63,453 patients. The authors concluded that although the exact additive value of locoregional treatments for mPDAC patients could not be distilled from the results, locoregional primary pancreatic and metastatic treatment appeared beneficial for a highly selected group of oligometastatic PDAC patients. Moreover, these researchers stated that for definite recommendations, large, prospective, well-designed RCTs with strict inclusion and exclusion criteria are needed to validate these findings; locoregional treatment for mPDAC should not be provided outside the context of an experimental trial. The evidence is insufficient to determine the effects of the technology on health outcomes.

Coil Embolization for Treatment of Left Ventricular Outflow Tract (LVOT) Pseudoaneurysm

Kumar et al (2012) noted that cardiac and aortic pseudoaneurysms are rare complications following myocardial infarction (MI) or cardiac surgery. They are characterized by a contained cardiac or aortic rupture within surrounding tissue and have a high mortality rate if left untreated. Percutaneous treatment of cardiac pseudoaneurysms might be a feasible therapeutic option in patients who are at high-risk of re-operative surgery. There is limited literature on the outcomes and the approaches to percutaneous treatment of these pseudoaneurysms. The authors reviewed the technical approaches, device selection strategies, outcomes, and complications with these percutaneous therapeutic options. The size of the pseudoaneurysm dimensions of its neck and relative anatomy, especially to the coronaries and valves, were critical issues to be addressed before percutaneous treatment of these pseudoaneurysms. The evidence is insufficient to determine the effects of the technology on health outcomes.

Embolization for the Treatment of Persistent Sciatic Artery

Persistent sciatic artery (PSA) is a relatively rare congenital variant of the lower limb vasculature and can have highly variable clinical presentations. Muniz et al (2024) reported a case of a patient with bilateral PSAs and an infra-renal aortic aneurysm. The aneurysm was successfully treated by the endovascular approach. An ultra-low profile endograft associated with access incisions slightly above the usual position was used to overcome this challenging access. The authors stated that the therapeutic options for PSA aneurysms are

open ligation and bypass, coil embolization, or endograft deployment. The evidence is insufficient to determine the effects of the technology on health outcomes.

Paraumbilical Vein Coil Embolization for the Treatment of Hepatic Encephalopathy

Cho et al (2014) examined the feasibility of percutaneous access via the re-canalized paraumbilical vein for varix embolization and stated that this study had 2 main drawbacks. First, the study population was too small ($n = 1$ for umbilical varix embolization); further study with a larger population is needed to confirm the safety of percutaneous access via the paraumbilical vein. Second, the study lacked a comparison with other access methods such as the trans-splenic and trans-hepatic approaches; however, the paraumbilical vein is superficially located in the abdominal wall, and the authors believed that access via the paraumbilical vein is much easier for inexperienced operators. Further studies in 2021 (Ferenci, Chalela, and Goldberg and Chopra) related to the treatment of hepatic encephalopathy did not mention paraumbilical vein coil embolization as a management or therapeutic option. The evidence is insufficient to determine the effects of the technology on health outcomes.

Endovascular Embolization in the Treatment of Spinal Dural Arteriovenous Fistula

In a meta-analysis, Yuan et al (2022) compared the effectiveness of microsurgery and endovascular embolization in the treatment of spinal dural arteriovenous fistula (SDAVF). These researchers carried out a systematic review to retrieve all relevant studies regarding surgical treatment or endovascular embolization of SDAVF. A total of 46 studies involving 1,958 cases of SDAVF were included, in which 935 cases were treated by microsurgery and 1,023 cases were treated by endovascular embolization. The results of meta-analysis showed that the incidence of early surgical failure was lower than that of endovascular embolization and the long term recurrence was also lower than that of endovascular embolization. The improvement of neurological function in the surgical patients was significantly higher than that in the patients treated with endovascular embolization. There was no significant difference in the occurrence of complications between the 2 groups. In the cases of endovascular embolization, the risk of treatment failure or recurrence was higher with Onyx glue than with n-butyl 2-cyanoacrylate (NBCA), and the difference was statistically significant. The authors concluded that although the treatment of dural arteriovenous fistulas by intra-vascular embolization has been widely used, the clinical effect of microsurgery was still better than that of endovascular embolization. Moreover, these researchers stated that large scale and high-quality randomized controlled trials are needed to validate the safety and effectiveness of endovascular treatment in SDAVF patients. The evidence is insufficient to determine the effects of the technology on health outcomes.

Genicular Artery Embolization for the Treatment of Osteoarthritis Related Knee Pain

Torkian and colleagues (2021) noted that genicular artery embolization (GAE) is an innovative technique that has been examined as a supplementary therapy for chronic pain secondary to knee osteoarthritis (OA). In a systematic review and meta-analysis, researchers examined the available evidence on the safety and effectiveness of GAE for OA-related knee pain. They carried out a systematic literature search to identify studies related to knee OA treated with GAE. Therapeutic agents were categorized as embolene, imipenem/cilastatin, resorbable microspheres, and polyvinyl alcohol. Of 379 initially inspected studies, 11 ($n = 225$ patients; 268 knees) were included in the final review. The quality of the studies was fair in 8 and poor in 3-categorized according to the National Institutes of Health quality assessment tool. No significant difference between embolic agents was observed with regard to post-GAE pain reduction. No severe or life-threatening complications were reported. The authors concluded that this systematic review revealed that mild-to-moderate OA treated by GAE using different embolic particles could generally be considered safe, with no reported serious complications. The procedure resulted in significant and sustained pain improvement as well as better functional status in the studies reviewed. However, because of the paucity of high-quality trials, further investigation is needed to examine GAE's long-term outcomes, its comparative efficacy with other treatment modalities, and its role in the therapeutic approach. These researchers stated that as far as the general drawbacks of the study were concerned, available studies lacked a control group (other treatment modalities). Furthermore, the studies had been reported from a limited number of geographical regions; therefore, further patient-centered investigations of the GAE safety and effectiveness in other geographical regions, with a larger sample size from different ethnic groups and longer duration of follow-up, is needed to improve the quality of evidence in terms of safety, durability, and efficacy of this

treatment. In a systematic review, Casadaban and associates (2021) stated that future studies should be standardized to facilitate comparison and control for placebo effect. The evidence is insufficient to determine the effects of the technology on health outcomes.

HydroPearl Microspheres for the Treatment of AVMs in the Lower Extremity

Stone (2022) states that “For symptomatic AVFs that fail compression-based therapy, we recommend surgical repair (Grade 1B). Endovascular repair with a covered stent or coil embolization are alternative treatments for patients who may not tolerate trivial bleeding, have a hostile groin (e.g., prior surgery), or have a prohibitive risk for general anesthesia”. Microsphere is not mentioned as a therapeutic option in this review. The evidence is insufficient to determine the effects of the technology on health outcomes.

Bariatric Arterial Embolization to Treat Obesity

Bariatric arterial embolization is proposed weight loss therapy which utilizes surgically induced metabolic changes by targeting the endocrine function of the gastric fundus, to decrease the appetite. Therapy involves injections of embolic microspheres into the gastric arteries to produce localized ischemia. While the procedure is considered less invasive than bariatric surgeries, weight loss does not appear to be as robust when compared to other therapies (Weiss, 2019). The evidence is insufficient to determine the effects of the technology on health outcomes.

Middle Meningeal Artery Embolization for Chronic Subdural Hematoma

Srivatsan and colleagues (2019) stated that chronic subdural hematoma is a very common neurosurgical condition. Although conventional surgical methods, such as burr hole irrigation, have been the mainstay of treatment, middle meningeal artery (MMA) embolization has emerged as a promising adjunctive or alternative treatment. These investigators performed a meta-analysis and systematic review of this topic. The authors concluded that MMA embolization is a promising treatment for chronic subdural hematoma; they stated that future randomized clinical trials are needed.

Ironside and colleagues (2021) noted that mMMA embolization has been proposed as a minimally invasive treatment for chronic sub-dural hematoma (cSDH). In a systematic review and meta-analysis, these researchers compared outcomes after MMA embolization versus conventional management for cSDH. They carried out a systematic review of studies reporting outcomes after MMA embolization for greater than or equal to 3 patients with cSDH were included. A metaanalysis comparing MMA embolization with conventional management was performed. The analysis comprised 20 studies with 1,416 patients, including 718 and 698 patients in the MMA embolization and conventional management cohorts, respectively. Compared with conservative management, MMA embolization was associated with lower rates of cSDH recurrence and surgical rescue. In-hospital complication rates were comparable between the 2 cohorts. The authors concluded that MMA embolization is a promising minimally invasive therapy that may reduce the need for surgical intervention in appropriately selected patients with cSDH. Moreover, these researchers stated that additional prospective studies are needed to examine the long-term durability of MMA embolization, refine eligibility criteria, and establish this endovascular approach as a viable definitive treatment for cSDH. The evidence is insufficient to determine the effects of the technology on health outcomes.

Pre-Operative Embolization for Carotid Body Tumor Resection

Texakalidis and associates (2019) stated that there is evidence suggesting that pre-operative selective EMB could reduce blood loss during surgery and decrease the risk of peri-operative complications; however, recent reports have questioned the benefits that pre-operative EMB provides. These investigators examined the impact of pre-operative EMB on CBT surgical resection utilizing Systematic Reviews and Meta-Analyses guidelines. Eligible studies were identified and a total of 25 studies comprising 1,326 patients were included. Patients who received pre-operative EMB had statistically significant lower intra-operative blood loss. Duration of the procedure was statistically significantly shorter in the pre-EMB group than the non-EMB group. There were no differences in the rates of cranial nerve (CN) injuries, stroke, transient ischemic attacks (TIAs) or length of stay between the 2 groups. The authors concluded that patients who received EMB prior to CBT resection had statistically significant lower blood loss and shorter duration of operation; the clinical

significance of these differences were unclear. Furthermore, the rates of CN palsy, stroke, TIA, and LOS were similar between patients who had preoperative EMB and those who did not. The evidence is insufficient to determine the effects of the technology on health outcomes.

Prostatic Arterial Embolization for Benign Prostatic Hyperplasia

Prostatic Arterial Embolization is a minimally invasive treatment option that works by reducing blood supply to prostatic arteries. An interventional radiologist injects microspheres through a catheter to the blood vessels around the prostate, reducing the blood supply to multiple different areas. No surgical intervention is required for this procedure and recovery times are often less than that of TURP. PAE requires significant clinician training and is associated with some common side effects such as “post-PAE syndrome, blood in urine or semen, rare cases of prostatic or bladder spasms.

Prostatic arterial embolization (PAE) has been evaluated in single arm prospective studies and one recent randomized comparative study (Insausti et al, 2020). Primary outcomes include reduction of urinary flow output symptoms, decreased IPSS scores, and increased quality of life scores from baseline. While PAE has shorter recovery times and fewer adverse events compared to TURP, clinical outcomes were on par. The available studies are limited by lack of small population sizes, lack of long-term outcomes for randomized control arm, and unknown benefit in different size prostates. The evidence is insufficient to determine the effects of the technology on health outcomes.

Hemorrhoidal Embolization

De Gregorio et al (2023) stated that catheter-directed hemorrhoidal embolization (CDHE) has provided encouraging outcomes in patients with hemorrhoids and mild prolapse Goligher grade-I to grade-III with persistent rectal bleeding. These preliminary findings need to be validated by well-designed studies. The evidence is insufficient to determine the effects of the technology on health outcomes.

CODING

Medicare Advantage Plans and Commercial Products

The following CPT codes are considered medically necessary when the medical criteria, above, are met:

- 37242** Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; arterial, other than hemorrhage or tumor (eg, congenital or acquired arterial malformations, arteriovenous malformations, arteriovenous fistulas, aneurysms, pseudoaneurysms)
- 37243** Vascular embolization or occlusion, inclusive of all radiological supervision and interpretation, intraprocedural roadmapping, and imaging guidance necessary to complete the intervention; for tumors, organ ischemia, or infarction

RELATED POLICIES

Centers for Medicare and Medicaid Services (CMS) National and Local Coverage Determinations

Medical Necessity

Prior Authorization of Services, Treatments or Procedures

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Provider Update, December 2025

Provider Update, June 2024

Provider Update, August 2023

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