Transjugular intrahepatic portosystemic shunt

Background

A transjugular intrahepatic portosystemic shunt (TIPS) is a percutaneously created connection that is placed between the portal vein, which carries blood from the intestines to the liver, and the hepatic vein, which carries blood from the liver back to the heart. It is used primarily in patients with severe liver disease where scar tissue from the disease is blocking the flow of blood passing through the liver from the portal vein to the hepatic vein.

The blockage increases the pressure in the portal vein. As a result, blood flows around the liver via small, unimportant veins (varices) that connect the portal vein with other veins within the abdomen. These veins enlarge in the stomach and lower esophagus, and have a tendency to bleed massively, which can cause death from exsanguination. By providing an artificial path for blood traveling from the intestines, through the liver, and back to the heart, the pressure in the varices is reduced and rupturing and bleeding is prevented.

The TIPS procedure is a nonsurgical way of creating the artificial path. In the procedure, an interventional radiologist who uses x-ray guidance passes a small catheter through the patient’s jugular vein in the neck into a hepatic vein in the liver. Through the catheter, a connection is made between the portal vein and a vein draining the liver. A tract is formed with angioplasty and stent techniques, which creates a shunt within the liver. This shunt relieves the pressure build-up within the portal vein, which in turn treats the bleeding caused by varices as well as the fluid accumulation in the abdomen (ascites).

In the past, liver disease leading to portal hypertension was treated surgically. In a major operation, surgeons created a bypass by connecting the portal veins to large veins in the abdomen, which drain into the heart. This operation was usually performed on critically ill patients and had high rates of complications and death.

TIPSs are as effective as shunts that are created surgically, but the procedure is much safer and patients experience a much shorter recovery time. The procedure is usually performed with intravenous sedation without the need to experience the risk of general anesthesia.
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**Involved specialties**

Interventional radiologists

**Positions of societies and academies**

The Society of Interventional Radiology and the American College of Radiology (ACR) developed and wrote collaboratively the **Practice Guideline for the Creation of a Transjugular Intrahepatic Portosystemic Shunt (TIPS)**. In the guideline, it is stated that TIPS must be performed under the supervision of and interpreted by a physician who has the following qualifications:

- Certified in radiology or diagnostic radiology by the American Board of Radiology (ABR), the American Osteopathic Board of Radiology, the Royal College of Physicians and Surgeons of Canada (RCPSC), or Le College des Medecins du Quebec
- Completed a minimum of 12 months’ training and experience in vascular/interventional radiology (VIR) in an Accreditation Council for Graduate Medical Education (ACGME)–approved radiology residency training program and/or interventional/vascular radiology fellowship program
- In the absence of either ACGME-recognized residency training or of formal fellowship training in a radiology residency review committee accredited VIR fellowship program or of other postgraduate training that included comparable instruction and experience in interventional and vascular angiography, completed at least two years’ experience with demonstrated competency as primary operator in diagnostic angiography under the supervision of an on-site qualified physician
- Performed a minimum of 100 diagnostic arteriograms, 50 angioplasties (25 as primary operator), 10 vascular stents, and five embolization procedures with documentation of success and complication rates as described in the appropriate ACR practice guidelines, technical standards, or policies
- Performed a minimum of five TIPS procedures, which must have been performed or supervised with documented success and complication rates that meet the threshold criteria listed in appendix B and C of the guideline
- Substantiation in writing by the director of interventional radiology or the chief of the department of radiology of the institution that the physician is familiar with all of the following:
  - Indications and contraindications for the procedure
  - Preprocedural assessment and intraprocedural monitoring of the patient
  - Pharmacology of moderate sedation medications and...
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recognition and treatment of complications and reactions associated with them
- Appropriate use and operation of fluoroscopic and radiographic equipment, mechanical injectors, digital subtraction, and other electronic imaging systems
- Principles of radiation protection, hazards of radiation exposure to both patients and radiologic personnel, and monitoring requirements
- Pharmacology of contrast agents and recognition and treatment of adverse reactions to these agents
- Percutaneous needle and catheter introduction techniques
- Technical aspects of performing the procedure, including the use of multiple catheter and guidewire systems, selective angiographic methods, vascular embolization and thrombolytic methods, appropriate injection rates, and volumes of contrast media and filming sequences
- Knowledge of potential intraprocedural complications and appropriate treatment options regarding these complications
- Anatomy, physiology, and pathophysiology, including pressure monitoring of gastrointestinal and hepatic vasculature
- Interpretation of gastrointestinal, hepatic, arterial, and venous vascular studies
- Postprocedural patient management, especially recognition and initial management of complications
- Postprocedural patient monitoring and management of adverse clinical sequelae, including stent stenosis, ascites, and hepatic encephalopathy

To maintain competence, the guideline states that physicians must perform a sufficient number of TIPS procedures to maintain their skills, with acceptable success and complication rates as laid out in the guideline. Continued competence should depend on participation in a quality improvement program that monitors these rates. Appropriate attendance at postgraduate courses that provide continuing education on diagnostic advances, newer techniques, and equipment is necessary.

Positions of other interested parties

The ABR issues a 10-year time-limited certificate of added qualifications in VIR. Candidates for the certificate must meet the following training and experience requirements:

• Be an ABR diplomate in radiology or diagnostic radiology.
• Successfully complete one year of fellowship training (after
residency) in a VIR program approved for such training and accredited by the ACGME or the RCPSC.

- Complete one year of practice or additional training in VIR.
- Present documentation of having completed at least 700 invasive cases (primary operator in at least 50%), which must include at least 500 from the fellowship year. These cases must comprise diverse training and post-training practice experiences with an acceptable rate of major complications. A minimum of 100 angiograms, 50 angioplasties (the latter to include arterial and venous procedures, peripheral, visceral, renal, and brachiocephalic procedures, dialysis-access interventions, and stent and endograft placements), and at least 10 cases of thrombolytic therapy must be included.

Experience must also include embolizations and a broad range of nonvascular interventions, including biopsies, drainages, organ access procedures, and miscellaneous interventions.

According to Michael D. Darcy, MD, chief of interventional radiology at the Saint Louis–based Washington University Mallinckrodt Institute of Radiology, interventional radiologists are the specialists who should be performing TIPS. They are the physicians who receive the requisite training and experience for performing the procedure in their VIR fellowship programs.

“TIPS is one of the most complicated procedures we do in interventional radiology,” Darcy says. When physicians are creating a TIPS, they must have the ability to translate a two-dimensional fluoroscopic image into a three-dimensional image in their mind so they know how to get from one vein to another. It becomes even more difficult because with some TIPS patients it is very hard to see anything because they have a lot of ascites.

Darcy says applicants for TIPS privileges should be able to demonstrate that they have successfully performed five procedures. He estimates that five cases should be sufficient for competence because there is a fair amount of overlap between some aspects of creating a TIPS and other procedures that interventional radiologists learn in their fellowship programs. “Five procedures is a reasonable number for learning to do the procedure without setting the bar so high that no one can meet it,” he says.

Patient safety is another reason why Darcy says TIPS cases should be performed by experienced interventional radiologists.
“If [TIPS] is not done appropriately, radiation burns for some patients can result,” he says. “Interventional radiologists have a firm knowledge of radiation safety.”

“Typically, the interventional radiologists who perform the procedure are physicians who were exposed to TIPS in their VIR fellowship program,” says Ziv J. Haskal, MD, director of the Division of Vascular and Interventional Radiology at the New York City–based Columbia University Medical Center. “But there are also interventional radiologists who are grandfathered into the subspecialty and never had fellowship training in TIPS.” These physicians learned the procedure by attending training courses, national or local workshops, and/or performing TIPS with experienced partners or preceptors.

Haskal says interventional radiologists not only have to be proficient in performing TIPS, but they must also have a firm understanding of acute and chronic liver disease. This knowledge is necessary so they can determine who are appropriate candidates for the procedure. As treating physicians, they have to fully understand the indications as well as the absolute or relative contraindications for creating TIPS in patients.

“For physicians who are seeking initial privileges to perform TIPS,” says Haskal, “it is reasonable to require that they should have done five of these procedures.” These cases could have been performed in a formal training program or under the supervision of an experienced TIPS interventional radiologist who guided the trainee through the procedure as the lead physician.

Setting criteria for maintaining competence in performing TIPS can be trickier. “If physicians perform only one or two TIPS procedures per year,” says Haskal, “it can be very difficult for them to achieve and sustain the experience necessary to deal with the anatomic intricacies of the procedure.” But if the number is set at a higher level (i.e., five cases per year) physicians who perform TIPS in emergency circumstances could find themselves in trouble because they have not done the requisite number of cases. “I would not be willing to put that kind of restriction on physicians,” he says. “It could prevent them from acting when it might save a life.”

The following draft criteria are intended to serve solely as a starting point for the development of an institution’s policy regarding this procedure.

**CRC draft criteria**

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*Columbia University Medical Center, New York City*
Minimum threshold criteria for requesting core privileges in TIPS

Basic education: MD or DO

Minimum formal training: Applicants must have completed an ACGME/American Osteopathic Association (AOA)–accredited training program in radiology or diagnostic radiology, followed by completion of an accredited fellowship training program in VIR. If applicants did not complete VIR specialty training or TIPS was not included in the specialty program, they must demonstrate training in the procedure that is equivalent to VIR specialty training. Proctored initial cases are recommended.

Required previous experience: Applicants must be able to demonstrate that they have performed at least five TIPS procedures in the past 12 months.

References

A letter of reference should come from the director of the applicant’s TIPS training program. Alternatively, a letter of reference regarding competence should come from the chief of VIR at the institution where the applicant most recently practiced.

Reappointment

Reappointment should be based on unbiased, objective results of care according to the organization’s existing quality assurance mechanisms.

Applicants must be able to demonstrate that they have maintained competence by showing evidence that they have performed at least five TIPS procedures annually over the reappointment cycle.

In addition, continuing education related to TIPS should be required.

For more information

For more information regarding this procedure, contact:

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Privilege request form
Transjugular intrahepatic portosystemic shunt (TIPS)

In order to be eligible to request clinical privileges in TIPS, an applicant must meet the following minimum threshold criteria:

- Basic education: MD or DO.

- Minimum formal training: Applicants must have completed an ACGME/AOA–accredited training program in radiology or diagnostic radiology, followed by completion of an accredited fellowship training program in VIR. If applicants did not complete VIR specialty training or TIPS was not included in the specialty program, they must demonstrate training in the procedure that is equivalent to VIR specialty training. Proctored initial cases are recommended.

- Required previous experience: Applicants must be able to demonstrate that they have performed at least five TIPS procedures in the past 12 months.

- References: A letter of reference should come from the director of the applicant’s TIPS training program. Alternatively, a letter of reference regarding competence should come from the chief of VIR at the institution where the applicant most recently practiced.

- Reappointment: Reappointment should be based on unbiased, objective results of care according to the organization’s existing quality assurance mechanisms.

  Applicants must be able to demonstrate that they have maintained competence by showing evidence that they have performed at least five TIPS procedures annually over the reappointment cycle.

  In addition, continuing education related to TIPS should be required.

I understand that by making this request I am bound by the applicable bylaws or policies of the hospital, and hereby stipulate that I meet the minimum threshold criteria for this request.

Physician’s signature: ____________________________________________

Typed or printed name: ____________________________________________

Date: ____________________________________________