BlueCross BlueShield of Alabama

Name of Policy:

Three-D (3-D) Reconstruction for Computed Tomography, Magnetic Resonance Imaging, Ultrasound, or Other Tomographic Modalities

Policy #: 308
Category: Radiology

Latest Review Date: June 2013
Policy Grade: B

Background/Definitions:

As a general rule, benefits are payable under Blue Cross and Blue Shield of Alabama health plans only in cases of medical necessity and only if services or supplies are not investigational, provided the customer group contracts have such coverage.

The following Association Technology Evaluation Criteria must be met for a service/supply to be considered for coverage:

1. *The technology must have final approval from the appropriate government regulatory bodies;*
2. *The scientific evidence must permit conclusions concerning the effect of the technology on health outcomes;*
3. *The technology must improve the net health outcome;*
4. *The technology must be as beneficial as any established alternatives;*
5. *The improvement must be attainable outside the investigational setting.*

Medical Necessity means that health care services (e.g., procedures, treatments, supplies, devices, equipment, facilities or drugs) that a physician, exercising prudent clinical judgment, would provide to a patient for the purpose of preventing, evaluating, diagnosing or treating an illness, injury or disease or its symptoms, and that are:

1. *In accordance with generally accepted standards of medical practice; and*
2. *Clinically appropriate in terms of type, frequency, extent, site and duration and considered effective for the patient's illness, injury or disease; and*
3. *Not primarily for the convenience of the patient, physician or other health care provider; and*
4. *Not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of that patient's illness, injury or disease.*

Description of Procedure or Service:

Three (3) D imaging rendering can be used with computed tomography (CT), magnetic resonance imaging (MRI), ultrasound, or other tomographic modalities. This imaging can be performed two ways: One that does not require image post-processing on an independent workstation and one that does require an independent workstation. Previously, 2-dimensional (2D) reformatting-3D rendering was used but has now been replaced with newer technology. The 3D image rendering codes require concurrent physician supervision of image post-processing 3D manipulation of volumetric data sets and image rendering. Complex 3D image rendering often requires extensive independent workstation processing by a supervising physician and specially trained technologist. Some applications can be performed on the scanner using optional and expensive hardware/software. In comparison, the expedited 2D image reformatting in many situations can be performed rapidly by a technologist without a separate workstation or the need to take a scanner off-line for image processing with the evolution of the 2D reformatting virtually in real time. It has become the standard practice that 2D is included in the base imaging procedure.

The 3D imaging addresses complex renderings such as shaded surface rendering, volumetric rendering, maximum intensity projections (MIPs), fusion imaging, quantitative analysis such as segmental volumes and surgical planning. The reformatting study should be documented in a separate report or in a separate section of the radiologist report.

Policy:

Three (3-D) image rendering meets Blue Cross and Blue Shield of Alabama's medical criteria for coverage when the study is documented in a separate report and/or section of the radiologist's report and ***all*** the following criteria are met:

1. When used to evaluate the best approach to a mass or other structure seen on prior imaging and for which surgical intervention (including percutaneous biopsy, sampling or drainage) is planned and routine planar imaging is insufficient .
2. Evaluation of a complex fracture for which surgical repair is planned.
3. When used to image before computer-assisted endoscopic sinus surgery or stereotactic computer assisted volumetric intracranial surgery.
4. When the addition of 3D reconstruction is requested by the ordering physician and the test is medically necessary and supported by clinical and laboratory findings in conjunction with the following tests:
    a. MRI of the breast (77058, 77059)
    b. CAT, maxillofacial area (70486-70488)—For a complex fracture for which surgical repair is planned or for complex craniofacial disorders for surgical planning.
    c. CAT, spine (72125-72133)—In cases of acute trauma for surgical planning.
    d. MRI, spine, spinal canal (72141-72158) —In cases of acute trauma for surgical planning.
    e. MRI, orbit, face and/or neck (70540-70543) —For a complex fracture for which surgical repair is planned or for complex craniofacial disorders for surgical planning.

f. CT of the chest with contrast (71260, 71270)—For the evaluation of possible pulmonary embolism. (Non-covered with 71275.)

5. When the addition of 3D reconstruction is used in conjunction with cardiac echography (93306, 93307, 93308, 93312, or 93350) and the following criteria are met:
    a. The test is performed by a radiologist, cardiologist or anesthesiologist (intraoperative, TEE) for one of the following diagnoses and the echocardiogram is NOT considered normal (as defined by the results indicating a mild or moderate condition.)(This test should not be performed on a routine basis with every base echo but should only be performed in rare cases where the results will impact the patient's care).
        i. Valvular heart disease when the condition is considered severe and /or surgical repair is being considered
        ii. Mitral valve stenosis
        iii. Mitral valve insufficiency
        iv. Mitral valve prolapse
        v. Ischemic mitral regurgitation
        vi. Mitral valve endocarditis
        vii. Congenital mitral valve abnormalities
        viii. Aortic stenosis
        ix. Aortic regurgitation/insufficiency
        x. Endocarditis/aortic valve disorders
        xi. Congenital aortic valve disorders
        xii. Pulmonary valve stenosis
        xiii. Pulmonary valve endocarditis
        xiv. Tricuspid valve rheumatic or degenerative disease
        xv. Heart failure
            - Congenital heart disease
            - Status post heart valve repair or replacement
            - Cardiomyopathy

(TEE performed by an anesthesiologist, please **refer to medical policy #269-Intraoperative Transesophageal Echocardiography for additional coverage information)**

Three (3D) image rendering does not meet Blue Cross and Blue Shield of Alabama's medical criteria for coverage and is considered not medically necessary in the following conditions: When used with a diagnostic test not identified above, such as but not limited to:

1. Ultrasounds in maternity care
2. Virtual colonoscopy/CT colonoscopy
3. CT screening for lung cancer
4. Whole body CT screening
5. When used on a routine basis without being specifically ordered by the requesting physician for the base imaging procedure.
6. When used in conjunction with an imaging study which is investigational or determined to be not medically necessary.

The following are specific coding guidelines for 76376 and 76377:

- Procedure 76376 is included in procedure 76377 and should not be reported separately.
- These codes should not be reported separately from selected procedures which already contemplate the review of images in alternative display formats. This includes the following base codes: 70496, 70498, 70544-70549, 71275, 71555, 72159, 72191, 72198, 73206, 73225, 73706, 73725, 74175, 74185, 75635, 76377, 78000-78999, 0066T, 0067T, 0144T-0151T, 75557, 75559, 75561, 75563, 75565.

Blue Cross and Blue Shield of Alabama does not approve or deny procedures, services, testing, or equipment for our members. Our decisions concern coverage only. The decision of whether or not to have a certain test, treatment or procedure is one made between the physician and his/her patient. Blue Cross and Blue Shield of Alabama administer benefits based on the members' contract and corporate medical policies. Physicians should always exercise their best medical judgment in providing the care they feel is most appropriate for their patients. Needed care should not be delayed or refused because of a coverage determination.

Key Points:

In the late 1980s, 2D reconstruction using coronal, sagittal, multiplanar and/or oblique techniques were used to enhance CT data sources. Subsequent advancements in reformatting and reading techniques made 2D reconstruction compatible without tomographic modalities such as magnetic resonance imaging (MRI) or ultrasounds.

Three dimensional (3D) imaging evolved with time. This is a technique which uses artistic techniques of lighting, shading, and perspective to create a 2D image that has the illusion of depth. The development of 3D volumetric rendering of data adds considerably more anatomic information. These readings are useful for planning complex surgical procedures such as complex endoscopic sinus surgery.

Services for 3D rendering differentiate between those studies in which reformatting is performed on the acquisition scanner and those performed on an independent workstation. The American College of Radiology (ACR) and AMA have provided documentation to clarify the codes used to report the 3D rendering.

> "*Both 3D codes require concurrent physician supervision of image post-processing, 3D manipulation of volumetric data set and image rendering. For the 3D reconstructions not requiring image post-processing on an independent workstation, the physician will discuss with the technologist the need for 3D imaging and supervise the technologist in creating 3D images. For studies performed on an independent workstation, the physician will supervise and/or create the 3D reconstructions and adjust the projection to optimize visualization of anatomy or pathology. The 3D rendering codes are intended to address complex renderings such as shaded surface rendering, volumetric rendering, maximum intensity projections (MIPs), fusion of images from other modalities, and quantitative analysis (segmental volumes and surgical planning).*"

The ACR has specified that it is not appropriate to report the 3D rendering codes with certain selected procedures since these procedures already consolidate the review of images in

alternative display formats. Specifically, in CPT 2007, immediately under the listing of the 3D rendering codes descriptions, the AMA provides a list of codes that should not be reported in conjunction with these 3D rendering codes, all 2D reconstructions (reformatting) will be considered part of the base procedure code and should not be reported separately.

The progress in improved image quality has an impact on the applications in thoracic CT. The improvement in imaging the airways, combined with application of 3D image processing techniques yield substantial progress in diagnostic imaging of the lungs. By processing a 3D assessment of lungs and lobe regions, the CT-based approach has the potential to exceed perfusion scintigraphy in accuracy. Currently, this technology is useful in the evaluation of possible pulmonary embolism.

Although 3D ultrasound can produce more realistic and recognizable images when used in maternity care, the clinical significance remains unclear at this time. The perceived superiority of 3D ultrasound for detection of fetal abnormalities has not been definitely established in the peer-reviewed literature. Several authors (Timor-Tritsch et al, Bubb, et al) have published that it is difficult to determine the net effect of 3D ultrasound and outcomes for the maternity patient. They have also noted the lack of comparative studies to support the superiority of 3D ultrasound versus 2D for the evaluation of the central nervous system.

In the early 1990s, von Ramm, et al, developed the first real time 3D echocardiographic scanner capable of displaying cardiac motion. Improvements in the design and engineering of this technology have led to the expansion of this method of imaging for various cardiac disorders. The American Society of Echocardiography issued a position paper, March 2007 regarding the current status and future direction of 3D echocardiography.

The 3D echo is prepared from 2D images which have been processed off-line with customized or commercially available software. The cardiac structures are manually or semi-automatically traced to 3D image. A complete 3D echo protocol is contained in Table 1 below.

Table 1
A Complete 3D Echocardiographic Protocol

- Wide-angle acquisition, parasternal long-axis window: 3D color interrogation of the aortic and mitral valves; 3D color interrogation of the tricuspid and pulmonic valves
- Wide-angle acquisition, apical 4-chamber window: 3D color interrogation of the mitral, aortic, and tricuspid valves
- Wide-angle acquisition, subcostal window: 3D color interrogation of the atrial and ventricular septa
- Wide-angle acquisition, suprasternal notch: 3D color interrogation of the descending aorta

This imaging has good clinical application for valvular heart disease both in the standard diagnostic evaluation and in real-time guidance during surgical valve repair. A unique perspective is provided by 3D imaging and the visibility of the technique in assessing congenital heart disease. The accuracy, feasibility, and value of 3D echocardiography has been

demonstrated in the intraoperative environment. Intraoperative 3D transesophageal (TEE) monitoring has been found to provide accurate additional anatomic information compared with 2D TEE imaging.

Indications for three dimensional reformatting have expanded and currently is being used to assist with complex surgical planning where precise location and interventions are required to achieve optimal outcomes. Reformatting is used when routine planar imaging is not sufficient to accurately perform pre-surgical planning.

June 2013 Update
A search of the published literature through June 7, 2013, failed to identify any studies that would change the policy statement.

Key Words:
Three D, 3D, Rendering 3D of images, 3D reconstruction

Approved by Governing Bodies:
(FDA approval information) or Not applicable

Benefit Application:
Coverage is subject to member's specific benefits. Group specific policy will supersede this policy when applicable.

ITS: Home Policy provisions apply
FEP contracts: Special benefit consideration may apply. Refer to member's benefit plan.
Pre-certification requirements: Not applicable

Coding:

CPT Codes:	**76376**	3d rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; not requiring image postprocessing on an independent workstation
	76377	3d rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; requiring image postprocessing on an independent workstation

References:

1. American College of Radiology. Clinical examples in Radiology: A practical guide to correct coding. Clinical Examples in Radiology, Winter 2006, Vol. 2, Issue 1.
2. American Institute of Ultrasound in Medicine (AIUM). AIUM practice guideline for the performance of an antepartum obstetric ultrasound examination. June 4, 2003, http://www.aium.org.
3. American Institute of Ultrasound in Medicine (AIUM). Position statement: 3D technology. November 12, 2005, http://www.aium.org.
4. American Medical Association. CPT Changes 2006: An Insider's View.
5. Agler DA, Adams DB and Waggoner AD. Cardiac resynchronization therapy and the emerging role of echocardiography (Part 2): The comprehensive examination. Journal of the American Society of Echocardiography, January 2007, Vol. 20, Issue 1.
6. Browner: Skeletal Trauma: Basic Science, Management, and Reconstruction, 3rd edition. Diagnostic modalities in imaging spinal trauma: Advantages and limitations.
7. Browner: Skeletal Trauma: Basic Science, Management, and Reconstruction, 3rd edition, Chapter 37. Surgical treatment of acetabular fractures.
8. Bubb Jennifer and Matthews Anne L. What's new in prenatal screening and diagnosis? Prim Care Clin Office Pract 2004; 31: 561-582.
9. Coll Deirdre M, et al. Preoperative use of 3D volume rendering to demonstrate renal tumors and renal anatomy. RadioGraphics 2000; 20: 431-438.
10. Duszak Jr, R. The new reconstruction codes: 3-D is better than no D. American College of Radiology 2006, pp. 67-68, DOI 10.1016/j.jacr.2005.09.017.
11. Dyson RL, Pretorius DH, et al. Three-dimensional ultrasound in the evaluation of fetal anomalies. Ultrasound Obstet Gynecol 2000; 16: 321-328.
12. Fleming SM, Cumberledge B, et al. Usefulness of real-time three-dimensional echocardiography for reliable measurement of cardiac output in patients with ischemic or idiopathic dilated cardiomyopathy. The American Journal of Cardiology, January 2005, Vol. 95, Issue 2.
13. Fried MP, et al. Comparison of endoscopic sinus surgery with and without image guidance. American Journal of Rhinology, July-August 2002, Vol. 16, No. 4, pp. 193-197.
14. Gutierrez-Chico JL, Zamorano JL, et al. Comparison of left ventricular volumes and ejection fractions measured by three-dimensional echocardiography versus by two-dimensional echocardiography and cardiac magnetic resonance in patients with various cardiomyopathies. The American Journal of Cardiology, March 2005, Vol. 95, Issue 6.
15. Hung J, Lang R, et al. 3D echocardiography: A review of the current status and future directions. American Society of Echocardiography (ASE) Position Paper. J Am Soc Echocardiogr 2007; 20: 213-233.
16. Kuhnigk Jan-Martin, Dicken Volker, et al. New tools for computer assistance in thoracic CT. Part 1: Functional analysis of lungs, lung lobes, and bronchopulmonary segments. RadioGraphics 2005; 25: 525-536.
17. Levental Mark, Pretorius Dolores H, et al. Three-dimensional ultrasonography of normal fetal heart: Comparison with two-dimensional imaging. J Ultrasound Med 1998; 17: 341-348.
18. Medina L Santiago. Three-dimensional CT maximum intensity projections of the calvaria: A new approach for diagnosis of craniosynostosis and fractures. AJNR, November/December 2000; 21: 1951-1954.

19. Metson R, Coszena MJ, Gliklich RE, et al. The role of image guided systems for head and neck surgery. Archives of Otolaryngology—Head and Neck Surgery 1999; 125: 1100-1104.
20. Michailidis GD, Papageorgiou P and Economides DL. Assessment of fetal anatomy in the first trimester using two- and three-dimensional ultrasound. British Journal of Radiology 2002; 75: 215-219.
21. Prakasa KR, Dalal D, Wang J, et al. Feasibility and variability of three dimensional echocardiography in arrhythmogenic right ventricular dysplasia/cardiomyopathy. The American Journal of Cardiology, March 2006, Vol. 97, Issue 5.
22. Pretorius E Scott and Fishman Elliot K. Volume-rendered three-dimensional spiral CT: Musculoskeletal applications. RadioGraphics 1999; 19: 1143-1160.
23. Pretorius Dolores H, Borok N Nira, et al. Three-dimensional ultrasound in obstetrics and gynecology. Radiol Clinics of North America, May 2001, Vol. 39, Issue 3, pp. 499-521.
24. Timor-Tritsch IE and Platt LD. Three-dimensional ultrasound experience in obstetrics. Curr Opin Obstet Gynecol 2002; 14: 569-575.
25. Yu CM, Bax JJ, et al. Echocardiographic evaluation of cardiac dyssynchrony for predicting a favourable response to cardiac resynchronization therapy. Heart 2004; 90: vi17-vi22.

Policy History:

Medical Policy Group, June 2007 **(3)**
Medical Policy Administration Committee, July 2007
Available for comment July 13-August 27, 2007
Medical Policy Group, June 2008 **(3)**
Medical Policy Administration Committee, June 2008
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Medical Policy Group, January 2009 **(3)**
Medical Policy Group, May 2010 **(3)**
Medical Policy Administration Committee, May 2010
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Medical Policy Group, December 2012 **(3)**: 2013 Coding Updates: Verbiage change to Codes 76376 & 76377
Medical Policy Group, June 2013 **(2)**: No change in policy statement. Policy section reorganized.