Endovascular Repair vs Open Surgical Repair of Abdominal Aortic Aneurysms: Comparative Utilization Trends From 2001 to 2006

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Purpose: Within the past few years, endovascular aneurysm repair (EVAR) has come into use for the treatment of abdominal aortic aneurysms (AAAs). In many cases, EVAR has the potential to replace traditional open surgical repair (OSR), which is more invasive, risky, and expensive. The aim of this study was to determine to what extent EVAR is replacing OSR, whether the frequency of treatment is increasing with the advent of the less invasive approach, and which specialties are performing the procedures.

Materials and Methods: The Medicare Part B data sets for 2001 through 2006 were studied. Procedure volume and utilization rates per 100,000 Medicare beneficiaries were determined for the 7 *Current Procedural Terminology*®, fourth edition, procedure codes that describe EVAR and the 4 codes that describe OSR for AAA. Medicare's physician specialty codes were used to ascertain the specialties of the physician providers.

Results: A total of 31,965 OSRs for AAA were performed in Medicare beneficiaries in 2001, dropping to 15,665 by 2006 (−51%). In contrast, EVAR was carried out in 11,028 instances in 2001, increasing to 28,937 by 2006 (+162%). The utilization rate per 100,000 for OSR dropped from 90 to 42 (a rate decrease of 48) during the study period, while the rate for EVAR increased from 31 to 77 (a rate increase of 46). The combined utilization rate per 100,000 of the two types of interventions for AAA (EVAR and OSR) decreased from 121 in 2001 to 119 in 2006. In performing EVAR, procedure volume and market share in 2006 by specialty were 1) 22,003 procedures by surgeons, a 76% share; 2) 3,287 procedures by radiologists, an 11% share; 3) 1,915 procedures by cardiologists, a 7% share; and 4) 1,732 procedures by all other physicians, a 6% share.

Conclusions: Treatment for AAA seems to be an example of the responsible use of new technology by physicians. The newer, less invasive, and less risky procedure (EVAR) is replacing the older and more invasive procedure (OSR) to a considerable degree. However, the overall combined utilization rate of both types of AAA treatment has remained stable in the Medicare population. There is thus no evidence to suggest that the introduction of the newer approach has led to the overtreatment of patients. Although radiologists do have a role in EVAR, surgeons strongly predominate.

Key Words: Abdominal aortic aneurysms, endovascular aneurysm repair, vascular surgery, medical economics, radiology and radiologists, socioeconomic issues

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Abdominal aortic aneurysm (AAA) is a potentially fatal disease. Most physicians involved in the treatment of this condition now agree that intervention is indicated when an AAA reaches a diameter of ≥5.5 cm [1-3]. One of the most dramatic advances in recent years in the field of percutaneous vascular interventions has been the development of endovascular stent grafts, which can be used in the treatment of many (though not all) AAAs. This technique, now generally referred to as endovascular aneurysm repair (EVAR), was first described by Parodi, Palmaz, and Barone [4] in 1991 but did not come into

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widespread use until the early years of this decade [5-7]. A recent large-scale trial used matched cohorts of patients with AAAs to compare the results of EVAR with traditional open surgical repair (OSR) between 2001 and 2004 [7]. It was found that EVAR resulted in fewer complications and better short-term outcomes. Late survival in the two groups was similar.

When a less invasive and potentially improved technique such as EVAR is introduced, a concern is often raised that this will lower the threshold for using it and that more patients will then be advised to undergo the intervention. The purpose of this study was to determine whether the rate of intervention for AAAs has increased in recent years in the Medicare population as a result of the availability of EVAR. We also wanted to determine to what extent EVAR is replacing OSR. And because it is well known that both vascular surgeons and radiologists had important roles in developing this technique (eg, Parodi is a surgeon, while Palmaz is a radiologist), a secondary purpose was to ascertain which physicians are most actively involved in the use of EVAR.

MATERIALS AND METHODS

We used the Medicare Part B Physician/Supplier Procedure Summary Master Files for 2001 through 2006. These files cover the more than 37 million beneficiaries in the traditional Medicare fee-for-service program. They provide utilization data for all procedure codes in the *Current Procedural Terminology*®, fourth edition, manual. For each code each year, the files show the number of procedures performed, the specialties of the physicians receiving reimbursement, and other administrative information. Physician specialties are determined using Medicare's 108 specialty codes. For purposes of this study, physicians were categorized as radiologists, surgeons, cardiologists, and other physicians. The category of radiologists included the specialty codes for diagnostic radiology, interventional radiology, and nuclear medicine. Surgeons included vascular surgeons, general surgeons, and all other surgical specialties. The category of cardiologists included physicians with that specialty designation and also those with the code for vascular medicine. The reason for this was that many physicians practicing in the field of vascular medicine have their primary certifications in cardiology. All other specialties were placed in the "other physicians group". The procedure codes included in the study were the surgical procedure codes, as shown in Table 1. Seven of these codes can be used for EVAR, depending on the type of graft and the involvement of the iliac arteries. There are 4 OSR codes, depending on the involvement of iliac or visceral arteries. Codes for OSR of ruptured aneurysms were not included, nor were the codes for radiologic supervision and interpretation because that would have led to duplicate counting. Utilization rates per 100,000 Medicare fee-for-service beneficiaries were calculated and tracked from 2001 through 2006.

Table 1. *Current Procedural Terminology*, fourth edition, codes used in the analysis. Code 0078T is a level III Healthcare Common Procedure Coding System code

EVAR Codes	OSR Codes
34800	35081
34802	35091
34803	35102
34804	35131
34805	
34900	
0078T	

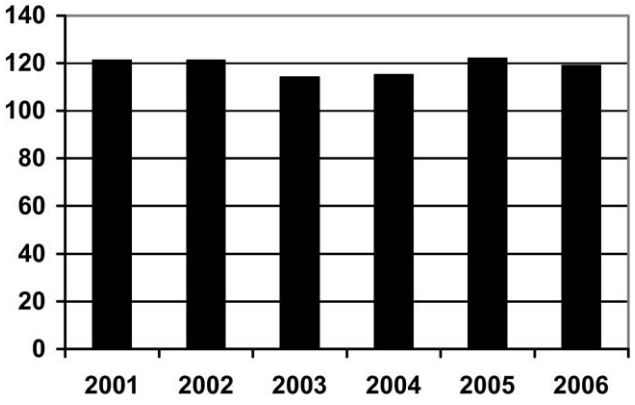

Fig 1. Rate of invasive treatment of AAAs in the Medicare population by either method (combined data for both EVAR and OSR), 2001 to 2006. The vertical axis shows the rate per 100,000 fee-for-service Medicare beneficiaries.

RESULTS

The overall utilization rate of interventions for AAA (both OSR and EVAR combined) between 2001 and 2006 is shown in Figure 1. In 2001, this rate was 121 procedures per 100,000 Medicare fee-for-service beneficiaries, and in 2006, it was 119 per 100,000, with the rate during the intervening years remaining relatively stable. Thus, there was essentially no change in the rate of use of interventions for AAA during the period of the study.

Figure 2 compares the changes in volumes of OSR and EVAR between 2001 and 2006. The volume of OSR in this population was 31,965 in 2001, but it had declined to 15,665 by 2006 (−51%). In contrast, EVAR volume increased from 11,028 in 2001 to 28,937 in 2006 (+162%). The two trend lines in Figure 2 are almost mirror images of each other, demonstrating steady