# Deconstructing Endoleaks

The unending saga of a once-clever new term that has become a source of confusion among nonvascular physicians.

**BY FRANK J. CRIADO, MD, FACS, FSVM**

*"We propose a preferable, novel terminology*—endoleak—*for this new phenomenon, which is associated only with endoluminal grafts. We have found this term to be beneficial in our own practice due to its specificity in describing leakage that remains within the confines of the vessel but external to the endoluminal graft."*

–Geoffrey White et al[1]

A 69-year-old man had experienced intermittent abdominal discomfort and repetitive bouts of what he described as indigestion for the past several weeks. His primary care physician ordered various tests and blood work, including a CT scan of the abdomen (with and without intravenous contrast) that was performed at a stand-alone imaging center. He was sent home after the study. Later that evening, a police officer was sent to his home to inform him that something was wrong with the CT scan findings and that the radiologist who read the films (and prompted this police action) was extremely concerned. The officer urged him to call 911 so the patient could be taken to the nearest hospital emergency department. Once there, another CT scan was performed that confirmed the presence of the "aneurysm with a leak" spreading the alarm to the emergency physician on duty. It was only after a long night of confusion and anguish spent in the emergency department that a well-informed vascular surgeon was finally reached and could clarify the situation. He established the diagnosis of a small post-EVAR type II endoleak that had been present and unchanged since the patient first had stent graft repair nearly 3 years previously (Figure 1).

There are innumerable examples of similar incidents often resulting in unnecessary scare—if not panic—and phone calls (to vascular surgeons and other aortic specialists) going out in the middle of the night. On the other end of the spectrum, I have encountered a couple of recent cases in which physicians did not react appropriately or understand the morbid potential of a newly developed late endoleak because they have been told or heard that endoleaks are not true leaks and that they occur frequently after EVAR and are often ignored and seldom, if ever, treated.

The scenarios described in this article highlight the current state of rampant confusion and misinformation that, at best, infuses anguish and causes a major inconvenience and, at worst, can needlessly imperil lives. In the majority of instances, the culprit main driver of such behavior is a radiologist reading a CT scan study—often from a remote site and without any knowledge at all of the patient's clinical situation or past history and/or an emergency department physician evaluating a patient who may have presented with or without related symptoms. But they are not alone in reacting with such fear upon the finding of an aortic

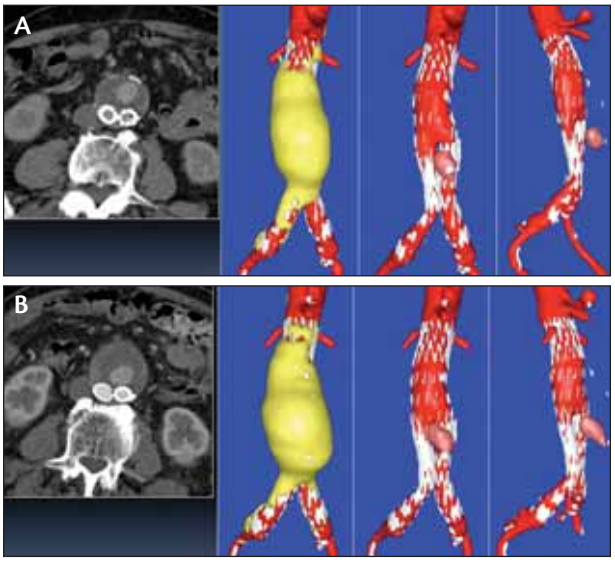


**Figure 1. Type II endoleak on initial post-EVAR CT scan (A). CT scan follow-up at 3 years post-EVAR (B).**

aneurysm with a leak—never mind someone may have called it an *endoleak*. I, for one, would not place any blame on them for behaving in this manner.

Incomplete exclusion of an aneurysm, both early and late, was identified as a unique complication of endovascular repair since its inception.[2,3] The phenomenon was increasingly recognized in the mid-1990s as various authors began to describe the presence of "leaks" to denote the persistence (or recurrence) of paragraft flow.[4-6] Geoffrey White et al were first to describe the growing problem with clarity and to coin a new term:[1] "This phenomenon results in paragraft flow, which may be detected … and has often been described in existing reports as a 'leak.' We submit that this terminology leads to confusion due to the common use of the word 'leak' to refer to extravasation of blood into the peritoneal cavity or tissues surrounding the aorta, associated with aneurysm rupture." They went on: "We propose a preferable, novel terminology—endoleak" (Figure 2). The proposal was welcomed as an important development, and the clever new term was received enthusiastically and adopted rapidly the world over.

For vascular surgeons and other aortic specialists, the term *endoleak* describes accurately the phenomenon of incomplete aneurysm exclusion. Unfortunately, everyone else in the medical community remains focused on the *leak* portion of the term because it elicits deep-rooted mental images of a ruptured or rupturing aorta. Although nuanced enough for vascular specialists, the differentiation intended by adding the prefix *endo* to compose a wholly new word and concept failed to achieve its goal because it retained the leak expression within the new term.

Nearly 15 years have passed, and the "endoleak saga" continues to grow larger and increasingly harmful. A number of factors combine to explain this current state of affairs. Three stand out: (1) the rise of stent graft intervention as the new standard of care for most patients undergoing treatment of AAAs, (2) the prevalence of endoleaks after endovascular repair, and (3) the enormous proliferation of CT scan studies in the population at large.

And now on to the real purpose of this editorial: can we extract the leak out of *endoleaks*? Is it too late to restore sanity through the proposal of a new term (or expression) that would serve us equally well at the time of describing and documenting incomplete aneurysm exclusion (after stent graft repair) but without any implied notion of a leaking aneurysm? Several such terms have been used in published reports over the years (see *Candidate Terms to Replace Endoleaks* sidebar). Among these, *sac flow* impresses me as the likely best candidate terminology to replace endoleak: it is absolutely clear and precise, unique to aneurysms, and does not carry any hidden or overt implication of a potentially life-threatening situation. A contrast-enhanced CT scan (or ultrasound study) could be reported as showing "evidence of sac flow" or "no evidence of sac flow." Moreover, sac flow could be further characterized as type I, type II, etc., in the exact same manner as endoleaks are classified today and with the same connotations.

**CANDIDATE TERMS TO REPLACE ENDOLEAK**

- Sac flow
- Paragraft flow
- Persistent flow
- Incomplete exclusion
- Incomplete thrombosis

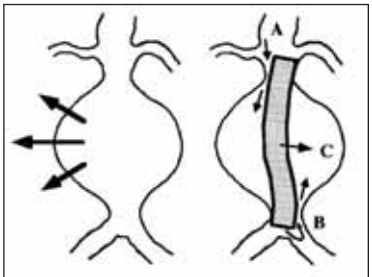


**Figure 2. Leak generally implies rupture of an aortic aneurysm (left). The proposed term endoleak can be applied to any form of paragraft flow in association with an endoluminal graft (right). This can be classified as proximal endoleak (A), distal endoleak (B), or graft-wall endoleak (C). Reprinted with permission from White GW et al. Letter to the Editors. *J Endovasc Surg.* 1996;3:123-125.[1]**

I fully recognize mine is just a small voice in the wilderness. To resonate, a proposal of this kind will need to elicit enough interest from endovascular experts around the world who can, in turn, propel the discussion to higher levels. Furthermore and ultimately, the major vascular and endovascular societies—and other stakeholders, regulators included—would have to become involved and embrace the cause. In the end, I believe that resolution of this problem would result in significant benefit to our patients, and to us all. ■

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