Editorial

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Journal of Vascular and Endovascular Therapy

2018
Vol.3 No.3:16

The Impact of Post-Implantation Syndrome

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Received date: September 20, 2018; **Accepted date:** September 21, 2018; **Published date:** September 28, 2018

Citation: Benyakorn T (2018). The Impact of Post-implantation Syndrome. J Vasc Endovasc Therapy. Vol.3 No.3:16

Editorial

For more than forty years, starting in 1951, open repair of the abdominal aortic aneurysm (AAA) was the gold standard treatment. In 1990, the renowned Juan Parodi-Vascular surgeon from Buenos Aires, Argentina- introduced a minimally invasive operation called endovascular aneurysm repair (EVAR) [1]. Currently, EVAR is the new gold standard for AAA treatment. EVAR has provided advantages over open repair such as: Less operative blood loss; shortened operative time; shortened hospital stay; and reduced recovery time.

Three large randomized controlled trials showed the early survival advantages of EVAR [2-4]. Presently there is an exponential increase of the EVAR procedure all over the world. However, many recent publications suggest that EVAR has a decrease in long-term benefits [5,6]. Even though the evolution of general healthcare has greatly improved, the five-year survival of EVAR patients remain poor [7]. When compared to open repair long term survival of EVAR has worsened in older patients and in cases of large aneurysm diameter [8,9].

Does the Inflammatory Response Play a Role in Long-Term Survival?

Interleukin-6 (IL-6) is known as a key cytokine of the inflammatory process. IL-6 is secreted from inflammatory tissue and also directly from aneurysms [10]. IL-6 was detected immediately after vascular injury and reached a peak level at 24-h post-operatively. One study demonstrated that the higher concentration of IL-6 in the post-operative period results in leukocytosis and a longer hospital stay [11]. In addition, high levels of IL-6 can affect 30-day mortality and long term survival rate. Dawson and colleagues also found there was a correlation between a high level of IL-6 in the post-operative period and long-term cardiovascular risk [12]. The rapid increase of inflammatory mediators in the circulation is known as post-implantation syndrome (PIS).

PIS can occur immediately after stent graft placement with the incidence of PIS varying between 14% to 60% [13-18]. In most cases, PIS is well tolerated, but in some particular cases it may contribute to severe complications, including renal function impairment, cardiovascular events, and multiple organ failure during the post-operative period [19].

The combination of leukocytosis, fever and an elevation in high-sensitivity C-reactive protein (hs-CRP) has been widely used for diagnosis of PIS [14,15], there is no evidence to clearly define the etiology of PIS [20,21]. Many factors have been suspected and proposed, such as, stent graft component, contrast medium-induced neutrophil degradation, bacteria translocation from transient sigmoid ischemia, endothelium injury in the implantation process, reaction of mural thrombus, thrombosis on the previous aneurysm sac, and volume of new-onset thrombus [17,22-27].

Can Any Device Minimize the PIS Effect?

Endovascular aneurysm sealing system (EVAS), the unique design for sealing the entire aneurysm sac in the active sac management, is completely different from traditional endovascular devices. The Nellix device (Endologix Inc., Irvine, Calif) consists of a 10 mm ballon-expandable stent graft covered by double layer polymer-filled endobag. The expanding endobags completely seal the entire aneurysm and separate the aneurysm sac from the systemic circulation (**Figures 1A and 1B**). This mechanism may prevent or decrease biochemical reaction within the aneurysm sac. This results in a reduced release of inflammatory mediators compared with omnipresent endovascular devices. A recent study showed that the incidence of PIS is lower in EVAS compared to EVAR (5.1% *vs* 20.5%, p=0.07). In addition, mean leukocyte count (p=0.003), mean body temperature (p=0.05), and mean hs-CRP (p<0.001) were relatively lower within the EVAS cohort. This evidence suggests that EVAS is associated with a blunted systematic inflammatory response when compared to EVAR [28].

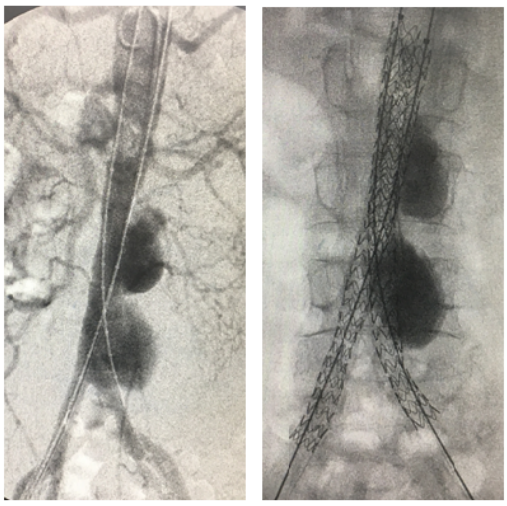

Figure 1A: Intra-operative angiogram; 1**B:** Procedural steps and endobags-filled aneurysm.

In conclusion, PIS is not a rare clinical entity and may contribute to severe complications. Although the etiology of PIS is not clearly defined, a preventive effort to reduce any inflammation should be attempted. EVAS, as a new innovative device is now clinically proven to decrease the incidence of PIS. Future research in reducing PIS is crucial.

Acknowledgement

The author kindly thanks Marina S. Ferguson-Department of Radiology, University of Washington-for adjusting the language to this article.

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