The Post-Implantation Syndrome After EVAR: What Is It And How Should It Be Diagnosed And Treated

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Post-implantation syndrome (PIS)

- Is the clinical and biochemical expression of an inflammatory response within the first five days after EVAR
- First described in 1999 (Velazquez et al, Am J Surg)
- The reported incidence has been varying widely from 14-60%
- The underestimation and the lack of a universally accepted definition

Definition of PIS

Is defined when fever and leukocytosis occur in the absence of any suspected infections after undergoing EVAR

Defined PIS as the presence of at least two of the systemic inflammatory response (SIRS) criteria

- Fever of more than 38°C (100.4°F) or less than 36°C (96.8°F)
- Heart rate of more than 90 beats per minute or less than 60 beats per minute
- Respiratory rate of more than 20 breaths per minute or arterial carbon dioxide tension (PaCO2) of less than 32 mm Hg
- Abnormal white blood cell count (>12,000/µL or <4,000/µL or >10% immature forms)
- Elevated Serum CRP levels above 10mg/L

EVAR as- and rAAA

Device related complications

- Endoleaks
- Migration
- Kinking
- Stenosis
- Infection

Systemic complications

- End-organ ischemia
- Cerebrovascular events
- Cardiovascular events
- Post-implantation syndrome

My Disclosures

✓ No disclosures
Retrospective analysis UZB 2016-2018

- 171 EVAR's
- Mean age = 71 yrs.
- Men/women: 163/8
- Mean diameter AAA: 6.1 cm

PIS (leukocytosis 12,000/µL and fever >38°C - >100.4°F)

78/171 = 45%

Three theoretical mechanisms of PIS

- Inflammatory response
- Anaphylactic response
- Infectious response

NONE OF THESE THEORIES HAVE BEEN PROVED

Inflammarory response

- Foreign body reaction
- Injury to the vascular endothelium
- Manipulation of the introducer catheters and sheets inside the pre-existing aneurysmal thrombus
- New-onset thrombus
- Contrast media

Infectious response

- Possibility of bacterial translocation by transient colon ischemia
  - This may result from occlusion or micro-embolism in the IMA or IIA

Anaphylactic response

- Allergic reaction against nitinol or metal exposure or polyester
- Elevated levels of cytokines and hS CRP produced by the activated mast cells
Predictors of PIS

- Woven polyester stronger inflammatory response compared to PTFE stent grafts
- Heart failure
- Higher volume of pre-existing thrombus or new-onset thrombus

Clinical implications of PIS

- Most of the cases are known to be benign and self-limiting
- Sometimes patient discomfort with low back-pain, longer hospital stay and higher incidence of re-admission

- Seldom in old patients with severe comorbidities, PIS can lead to serious complications
  - Pulmonary dysfunction
  - Cardiovascular events
  - Renal insufficiency
  - Multisystem organ failure - death
- PIS patients may need close surveillance

Treatment of PIS

- Controversial and no therapeutic algorithm has ever been established
- Aggressive use of anti-inflammatory drugs in the acute phase of extensive PIS

- Corticoid therapy
  - Pre-operative high-dose corticoid
  - Prolonged (five days) low dose prednisone after the EVAR
  - Use 500mg of hydrocortisone during EVAR (Gerasmidis et al 2005)
  - 1g of hydrocortisone IV on the third postoperative day in the case of PIS (Nano et al 2014)

- POMEVAR trial (de la Motte et al 2014)
  - High-dose methylprednisolone (30mg/kg) two hours prior to EVAR, showed a pronounced reduction of postoperative components of SIRS (92% to 27%)

- Randomized placebo-controlled study to evaluate whether perioperative administration of Naproxen, an anti-inflammatory drug, have any effect on the inflammatory response after EVAR

Conclusion

- PIS concerns more than one-third of patients after EVAR.
- Most of the cases are known to be benign and self-limiting but especially older patients with severe comorbidities can have serious complications. Therefore we recommend that patients with PIS should be under close surveillance during the hospital stay and post-discharge.
- Further studies are needed to evaluate therapeutic strategies for PIS.