

#1 **INCREASED RECOGNITION OF TYPE II ENDOLEAKS USING MODIFIED INTRAOPERATIVE ANGIOGRAPHIC PROTOCOL: IMPLICATIONS FOR INTERMITTENT ENDOLEAK, ANEURYSM EXPANSION AND ENDOTENSION**

Peter L. Faries, M.D., Gautam Agarwal, M.D., Vania L. Briggs, B.A.,  
Daniel Clair, M.D., K. Craig Kent, M.D., Larry H. Hollier, M.D.,  
Michael L. Marin, M.D.

Weill Cornell Medical School, New York, NY

**Objective:** Retrograde arterial perfusion of the aneurysm sac (type II endoleak) may complicate endovascular abdominal aortic aneurysm (AAA) repair and may lead to AAA expansion and rupture. Aneurysm expansion may also occur in the absence of a demonstrable endoleak. Current intraoperative assessment techniques may under represent the incidence of type II endoleaks. This study evaluated the incidence and impact of previously unrecognized type II endoleaks using a modified intraoperative angiographic protocol.

**Methods:** 387 patients undergoing endovascular AAA repair were evaluated. In 264 **standard** completion angiograms were performed. In 123 patients a **modified** angiographic protocol was used to visualize collateral lumbar and inferior mesenteric arteries as well as the aneurysm sac. The modified protocol uses digital subtraction fluoroscopy continuously for 60 seconds after injections of 20ml iodinated contrast in the pararenal aorta and the common iliac arteries. Postoperative CT scans were performed at 1, 6 and 12 months and annually. Average age was 73.3 yrs; 321 male: 66 female; mean follow-up: 11.4 months (range, 1-60months).

	Type II - Intraoperative	Type II – 1 Month	Type II – 6 Months	Type II – 12 Months
<b>Standard Angiography</b>	17/264 (6%)	12/228 (5%)	10/159 (6%)	6/138 (4%)
<b>Modified Angiography</b>	51/124 (41%)	15/113 (13%)	6/72 (8%)	2/36 (5%)
p-value	<0.001	0.025	NS	NS

**Results:** Type II endoleaks were documented in a significantly increased proportion of patients using the modified angiographic protocol (table). 46 type II endoleaks resolved spontaneously (10 standard, 36 modified). 1 patient demonstrated a 10mm increase in AAA diameter after spontaneous thrombosis of a type II endoleak 12 months postoperatively. 1 patient demonstrated a type II endoleak intraoperatively and at 12 months after surgery but the endoleak was absent at 1 and 6 months. 13 patients from the standard protocol cohort developed newly visualized type II endoleaks during follow-up. These findings imply intermittent patency of the artery supplying the type II endoleak. Major morbidity was 12.4%; perioperative mortality: 2%.

**Conclusions:** Retrograde endoleaks originating from AAA side branches occur more frequently than is currently recognized. Intermittent patency and thrombosis of these vessels may also occur and may contribute to endotension and AAA expansion. The full significance of these previously unrecognized endoleaks with respect to risk of aneurysm rupture remains to be definitively determined.