



# The risk of endoleak following stent covering of the internal iliac artery during endovascular aneurysm repair



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**AIM:** To investigate the risk of endoleak during endovascular aneurysm repair (EVAR) involving the distal common iliac artery (CIA) when the internal iliac artery (IIA) is covered without prior coil embolization.

**MATERIALS AND METHODS:** Retrospective analysis of 145 (125 men, 20 women) consecutive EVAR cases. Clinical notes and radiological images were reviewed, and data collected on patient demographics, aneurysm morphology, covering of the IIA with or without embolization, presence of endoleaks, and patient symptoms relating to IIA ischaemia.

**RESULTS:** A total of 29 IIAs (10%) were covered in a total of 25 patients. Seven IIAs (24%) were embolized before stent covering (Embolization group), and 22 IIAs (76%) were covered only without embolization (Cover group). There was no statistically significant difference in the mean size of the abdominal aortic aneurysm diameter or CIA diameter between each group. No endoleaks from IIA retrograde filling were found in either group.

**CONCLUSION:** The results of the present study do not support the traditional view that coverage of the IIA without prior embolization carries a high risk of endoleak, with no endoleaks seen in all 22 cases. Large-scale trials are required. However, the advent of branched-stenting techniques and the emergence of their success in long-term follow-up may preclude the former.

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## Introduction

Endovascular aneurysm repair (EVAR) has become common practice for the treatment of infrarenal abdominal aortic aneurysms (AAAs) in Great Britain and Ireland. Improved devices, increased operator experience, and favourable results have led to more challenging aneurysm

configurations being considered for endovascular repair, such as those involving the common iliac artery (CIA).<sup>1</sup>

The CIA usually serves as the distal endograft implantation zone (Fig 1). When the CIA is aneurysmal in its distal portion, the external iliac artery (EIA) is used as the landing zone to provide an adequate seal (Fig 2). As a consequence the internal iliac artery (IIA) orifice is covered and occluded, which has been associated with hip and buttock claudication, impotence, colonic ischaemia, paraplegia, pelvic necrosis, and atheroembolization.<sup>2,3</sup>

There has been a longstanding view that solely covering a patent IIA (without prior embolization) can result in retrograde flow into the aneurysm and subsequent

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**Figure 1** Abdominal radiograph demonstrating a standard EVAR with CIA distal landing zones.

endoleak, and in such cases, several authors have advocated the occlusion of the IIA by embolization.<sup>4,5</sup> However, there is little evidence to show that covering the IIA without embolization carries a significant incidence of endoleak, and debate remains as to whether embolization is required.

The present study describes the authors' experience of EVAR in which the IIA was covered without embolization, and the rate of endoleaks was compared to those in which the IIA was embolized prior to stent covering.



**Figure 2** Abdominal radiograph demonstrating an EVAR in which the right EIA has been used as the distal landing zone with coil embolization of the IIA.

## Materials and methods

In the period between September 2006 and May 2013 at The Princess Alexandra Hospital, 145 consecutive EVARs were performed for aortic, aorto-iliac, or iliac aneurysms. The imaging of all cases was retrospectively reviewed to identify those cases where the IIA was either covered (Cover group) or embolized and covered (Embolization group). The local ethics committee was consulted, and as a retrospective study, ethics was not required.

The case notes were interrogated for all identified cases with reference to the hospital inpatient admission, multi-disciplinary team meetings, clinical outpatient follow-up, and surgical operative record. In addition, all imaging for these cases was reviewed including pre- and postoperative imaging as well as radiological reports.

Data were collected on patient demographics, date of procedure, date of hospital discharge, preoperative aneurysm morphology and operative plan, procedural details, postoperative imaging, clinical findings, and further management.

### Imaging protocol

At The Princess Alexandra Hospital, the routine imaging protocol (except in emergency cases) involves a preoperative (usually within 6 weeks of surgery) arterial contrast-enhanced computed tomography (CT) angiogram acquiring axial images from the hemidiaphragm to the pubic symphysis. Postoperatively, a unenhanced and arterial contrast-enhanced CT examination is performed in the first few days following surgery in all patients, then is routinely performed at 3 months, 6 months, and subsequently at yearly intervals unless clinical/radiological findings require otherwise. In some stable cases, following a period of 3 years, further imaging follow-up using a combination of ultrasound examination and abdominal radiographs is considered.

### Clinical follow-up

Following discharge from hospital, routine clinical outpatient follow-up is usually conducted at 6 weeks, 6 months, and then yearly unless clinical/radiological findings require otherwise. Following several years of follow-up, some patients have been followed-up by telephone interview and a letter informing them of the findings of their most recent imaging.

### Preoperative planning

Aneurysms are routinely imaged with ultrasound until they approach a size at which repair is considered (5.5 cm for an abdominal aortic aneurysm), at which stage CT angiography is performed. All aneurysms being considered for repair are discussed at the vascular multidisciplinary team meeting (VMDT), which constitutes all those involved in the EVAR patient care pathway: vascular surgeons, interventional radiologists, and vascular nurse specialist.

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